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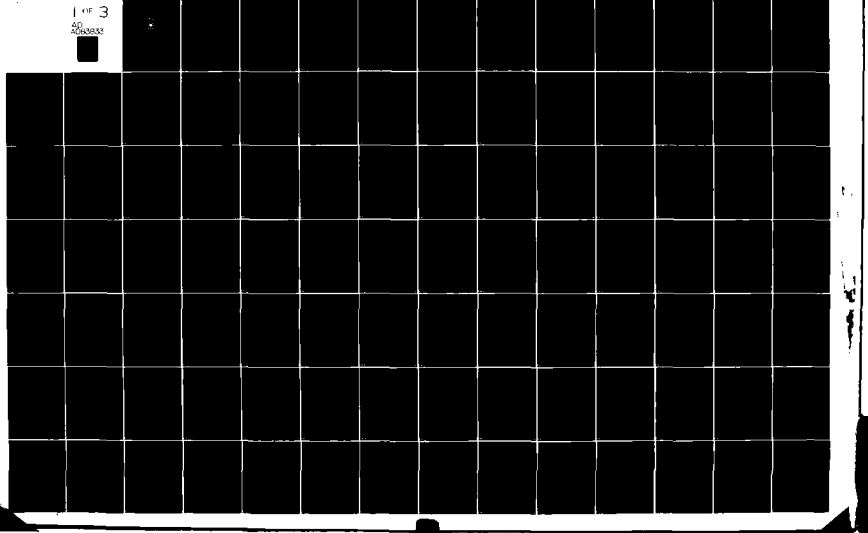

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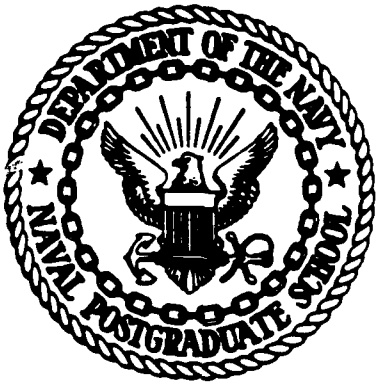

THESIS

A

CONTRAST BETWEEN MANAGEMENT INFORMATION NEEDS AND INFORMATION PROVIDED BY INDUSTRIAL ACCOUNTING/ CONTROL SYSTEMS EMPLOYED AT SELECTED COAST GUARD IN HOUSE MAINTENANCE ACTIVITIES

by

Ronald David Reck

December 1979

Thesis Advisor: R. B. Cunningham

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The study concludes with the observation that while the percentage of information needs currently being met by existing accounting and control systems is not high, system improvements such as the collection of additional information, and the presentation of information in slightly different aggregations could result in a much higher percentage of management information needs being fully met.

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Contrast Between Management Information Needs And Information Provided By Industrial Accounting/Control Systems Employed At Selected Coast Guard In House Maintenance Activities

by

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Lieutenant, United States Coast Guard
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Submitted in partial fulfillment of the
requirements for the degree of

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I. INTRODUCTION

A. BACKGROUND

Like the Department of Defense components, the Coast Guard finds a need to maintain an in house manufacturing-industrial-public works capability to facilitate repair and maintenance of its ships, boats, aircraft and physical plant. The reasons behind the need for such a capacity are three fold:

1. To perform work peculiar to the Coast Guard where volume is such that private industry is neither capable nor interested in supplying the demand.[1]

2. Where the work is of such a nature (either emergency, dangerous or isolated) that a civilian contractor would make the cost unreasonable or the delay unacceptable.[2]

3. To maintain an industrial force that can be employed quickly to facilitate the addition of armament to Coast Guard vessels in the event of war or other hostilities.

Essentially there are five types of activity that provide this capacity:

1. Aviation rework and repair is performed at the Coast Guard Aviation Repair and Supply Center in Elizabeth City, North Carolina.

2. Shipbuilding, conversion and repair including the handling of periodic major cutter availabilities, manufacture of Coast Guard small boats and fabrication of buoys is performed at the Coast Guard Yard in Curtis Bay, Maryland.

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[1]Commander (ei) Seventh Coast Guard District, Miami, Florida, Seventh Coast Guard District Work Order Manual, 23 October 1973, amended 1 March 1974, para. A01023.6, p. A-2.

[2]Ibid, para. A01023.6, p. A-2.

3. Multifunctional Engineering Support including minor ship repair, boat overhaul, civil engineering maintenance, buoy maintenance and repair, construction of fixed aids to navigation and maintenance of electronic equipment is provided both by major industrial support centers and by minor "Non-Industrial" bases.[3] There are approximately thirty of these activities located throughout the continental United States, Alaska, Hawaii and Puerto Rico.

4. Public Works Support including maintenance of physical plant structures and equipment and minor construction is provided by Facilities Engineering Divisions located aboard the C ast Guard's larger training and support centers.

5. Special purpose engineering support is provided by a number of small servicing teams such as Aids to Navigation Teams (ANT's), Electronics Repair units (ERS, EST and ESM's) and Assist Teams for major cutter engineering support.

Although the Coast Guard does not administer its maintenance activities through a system of "Material Commands," as do the DoD components, the maintenance activities are, at the very least, indirect instrumentalities of one of five engineering support programs under the direction of Headquarters and/or District Program Managers. Exhibit 1-1 depicts these relationships.

Also, the Coast Guard system attempts by various means, to measure effort and place a dollar value on the product of the maintenance activity. It is these means of accounting for and providing financial control over the resources made available for engineering support that is the subject of this paper.

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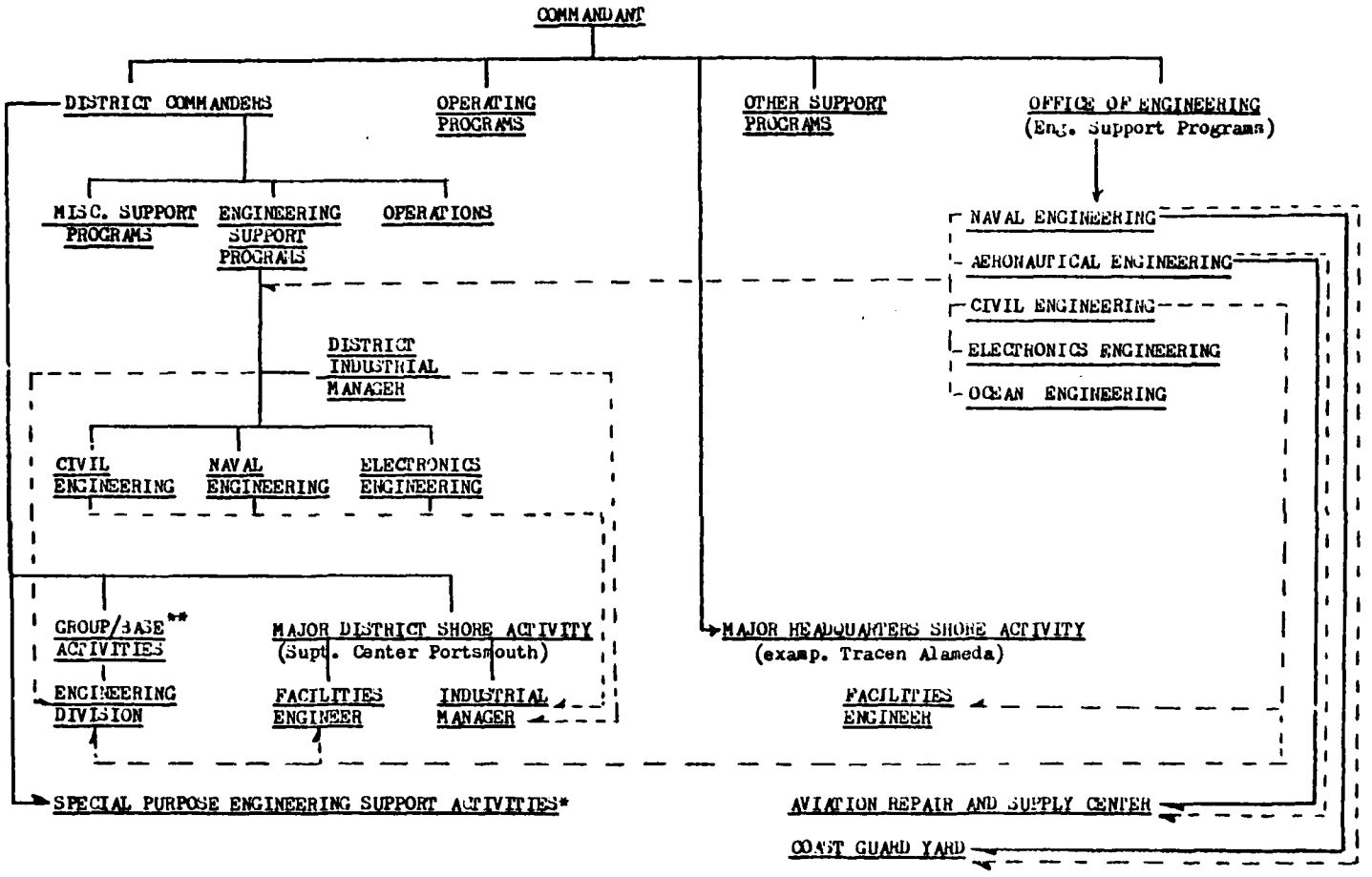
[3]"Non-Industrial" bases is really a misnomer. These activities are, in all respects, industrial type activities. "Non-industrial" refers, instead, to the type of accounting system employed.



* May be separate unit or division of larger unit.

** Non Industrial Activities

——————— Command

- Policy

Exhibit 1-1

B. PURPOSE OF THESIS

There are two principal purposes behind this study. The first is probably best stated by the following quotation from the Coast Guard Industrial Manager's Guide (CG-361):

> "If there is one single aspect of an industrial base that mystifies, bewilders, and confuses industrial managers, it is industrial accounting. Some industrial managers have trouble with scheduling men and work, some have trouble getting materials, some have trouble organizing their shops, but almost all have trouble with industrial accounting. Because of this, industrial managers tend to regard the matter with intense distrust and prefer to have all dealings with it handled by their staff industrial accountants."[4]

While this observation may have reflected the attitude of maintenance activity managers at the time the Industrial Manager's Guide was last amended (1965) it does not, in this writer's experience, reflect the attitude or interests of most of the operating level managers practicing today. It does, however, reflect the attitude of a few officers interviewed during the course of this study who have not had the opportunity to be exposed to accounting and financial control disciplines, yet whom are directly involved in policy relative to Coast Guard in house maintenance capability, it is typical of many operating unit managers (e.g., Commanding Officers of vessels, SAR stations, etc. who are frequently the beneficiaries of maintenance activity services) and regrettably, it is typical of many Coast Guard engineers who must interface with the maintenance activity on a daily basis.

This attitude is exacerbated by the fact that the directives and publications pertinent to industrial accounting and control are out of date (most were last revised in the mid 1960's). They seem to have been written as procedural instructions for accounting clerks rather than as a guide for the

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[4]Commandant (ei), U.S. Coast Guard, Washington, D.C., Industrial Management Guide (CG-361), 12 March 1962, amended 15 July 1965, para. 1.24, p. 1-20.

manager, and they tend to ignore the existence of electronic data processing. Further, there is not one but at least five systems of accounting used in the industrial environment. Aviation Repair and Supply Center, Elizabeth City maintains a formal cost accounting system but it is not integrated with its system of financing. The Coast Guard Yard operates under a Congressionally approved working capital fund similar to that used by DoD activities. Major industrial bases use a cost accounting system integrated with a clearing account (called Account 19) in place of a working capital fund. Finally, minor industrial bases and public works activities miantain informal and somewhat non-standard methods of accounting for cost and industrial effort. Added to this has been the more recent development of several specialized systems of control that, in fact, account for the use of maintenance dollars, time and labor but do not employ the debit/credit format familiar to the accountant. With the exception of a few local instructions, and some recent amendments to the Coast Guard Civil Engineering Manual (CG-251), these systems are virtually unmentioned in the official literature. Accordingly, it will be one intent of this paper to list and describe the major types of cost accounting/financial control methods used at in-house maintenance activities. It is intended that this description will cover the subject in terms the manager reasonably well versed in accounting and financial management will appreciate, but not be as deeply couched in the technician's terminology as the current system of financial/industrial management publications are.

The second purpose of this paper has its origins in the move in recent years toward standardized systems of accounting in the federal government. The Coast Guard has not been untouched by these developments and, in fact, has created an office in its Headquarters Comptroller Division to deal with

the issue. The concern of this writer is that while any changes to the present system of accounting implemented by Comptroller personnel will probably adequately represent those whose interests are primarily fiduciary, they may fail to consider those whose needs are primarily for management information. It is hoped, therefore, that this paper will bring to light some of the specific information needs of those interested in maintenance activity management, not only at the industrial manager/Public Works Officer level, but at the Command, District and Headquarters levels. Having identified these information needs this paper will compare those needs with the output of the accounting and control systems that now exist in an effort to determine the degree to which the present mechanisms meet management's information requirements.

Hopefully, this thesis will serve both as a reference document for future study efforts directed at the various accounting/financial control systems used to track the application of the Coast Guard engineering support resources, and will act as a partial guide for those involved in any future redesign or standardization of existing accounting systems.

C. RESEARCH METHODOLOGY

Research for this study was conducted first by narrowing the issue to an examination of accounting and financial control systems as they were represented by Aircraft Repair and Supply Center, Elizabeth City, North Carolina, the Industrial Division of Coast Guard Support Center, Portsmouth, Virginia, the Facilities Engineering Division of Coast Guard Training Center, Alameda, California, and the industrial sections of several small Non-Industrial activities. Three of these units, Elizabeth City, Portsmouth and Alameda were visited and local management interviewed in an effort to gain an understanding

of how the accounting/control systems worked and to determine actual management information needs. Similar information was sought via telephone with managers of the Non-Industrial activities and from higher policy making management levels such as Coast Guard Districts and Headquarters engineering support program managers.

To minimize the possibility that the incumbent managers' responses would not be representative of the typical individual who might otherwise occupy the studied billets, managers filling similar positions in other units throughout the Coast Guard were also interviewed. In total, twenty-nine managers were contacted, either in person or by telephone.

The interview routine used was a list of questions covering such areas as budgeting, performance measurement, resource management, fiscal control, external reporting, pricing and mission analysis. These questions were developed based on comments made and concerns expressed during a series of four preliminary interviews with senior maintenance activity managers and expanded upon based on theoretical material reviewed in conjunction with field research. This interview routine (included as Appendix A) was not intended to provide an analysis of the specific questions asked but to get the manager to talk about his job, to discuss the decisions he made, the information he used to make those decisions, to indicate the time frame in which information was needed, the accuracy required and to indicate information he felt would be helpful but which was not necessarily available at the time. A list of those managers interviewed is provided as Appendix B.

To supplement the above effort, information on the mechanics of the existing financial control/accounting systems was sought by an examination of current publications and directives including the Industrial Managers Guide (CG 361), Industrial and AR&SC sections of the Comptrollers Manual (CG 264) and several

pertinent District publications. Additionally, several managers who expressed interest in this project and vocalized concerns similar to this writers provided notes and correspondence they or their staffs had written on information requirements and/or the nature of accounting mechanisms currently employed at their units.

D. DEFINITION OF TERMS

A listing and brief discussion of some of the key terms and concepts to be used throughout the body of this paper is presented. It is by no means a complete orientation to the language common to Coast Guard industrial accounting and financial control, but is intended to cover terminology necessary for a ful understanding of this document.

1. Accounting

An information system which has as its function the provision of quantitative information about economic entities. The information provided is primarily financial in nature and normally presented in monetary terms. It is intended to be useful in the making of economic decisions and in making reasoned choices among alternative courses of action.[5]

2. Financial (or Management) Control Systems

As practiced in the Federal Government and specifically for the purpose of this paper, Financial or Management Control can be defined as any systematic quantitative method of tracking or controlling the use of resources (financial material or personnel) for which the government has, at some time, had to expend appropriated funds. This definition includes systems used to

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[5] Professional Standards - Accounting, Current Test, v. 3, para. 1022.01, Commerce Clearing House, Inc., 1 July 1978.

monitor or control progress of work or which assist managers in making decisions about how best to apply scarce resources.

3. Direct vs Indirect Costs

Direct costs are those which can be traced logically and practically in their entirety to a single cost objective (i.e., a single work order, individual piece of hardware such as a ship or aircraft, individual building or single benefiting unit). Indirect costs are those which relate to several cost objectives (e.g., the industrial managers salary which is incurred for the benefit of the industrial function as a whole but cannot be associated with any single work order).[6]

4. Direct vs Indirect Materials or Labor

Direct materials and labor are resources which may be identified logically, practically and specifically with the units' product. Indirect labor and materials are resources used in support of those employed or perform the primary industrial function.[7] For example, a shipfitter, while he was directly involved with a repair project aboard a Coast Guard vessel would be considered direct labor. The materials he used exclusively on the repair project would be direct materials. A supervisor who provided guidance to many employees on several different work orders could be considered indirect labor. Lubricants used to service shop machinery utilized on many different projects would be considered indirect materials.

5. Job Order vs Process Costing

Job order costing is a system of assigning costs to work orders in terms of distinct and identifiable units (e.g., an individual engine repair,

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[6]Fremgen, James M., Accounting for Managerial Analysis, p. 18, Richard D. Irwin, Inc., 1976.

[7]Ibid., p. 20.

the overhaul of a single boat or the roof repair for an individual building). The term specific work order is that most frequently used in the Coast Guard to identify a job order costed project. Process costing, on the other hand, is a system of assigning costs to work orders where production is considered a continuous flow and where the cost of work done on any individual item cannot be clearly isolated. The term most analogous to process costing in the Coast Guard industrial environment is continuous work order.[8]

6. Overhead

Overhead is probably the most frequently discussed and least understood concept in the industrial sector. Rather than define it in accounting terms, perhaps it would be more clear if defined in terms the "Operator" might be more familiar with. To facilitate this discussion, the reader is asked to consider himself the Commanding Officer of an icebreaker. An icebreaker is chosen because it has but one primary mission. The reader will undoubtedly agree that his vessel's time is spent one of three ways; breaking ice, traveling to and from the mission area or, while not underway, performing maintenance, reprovisioning or just taking a well deserved rest. The time and costs (including personnel costs) the Coast Guard incurs while the ship is either in transit or in the ice can clearly be identified as direct costs (i.e., those incurred while involved entirely with the mission). Other costs such as crew salaries earned in port, shore utilities and maintenance charges incurred while the ship is not in an underway status, the accountant would record as overhead. These are costs which are absolutely necessary to the vessel's operation but not clearly associated with time spent performing the primary mission. Examination of an historical record of costs the ship incurred

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[8]Ibid., p. 82-87.

throughout its life might allow the conclusion that our non-mission charges were a fairly constant percentage of the costs incurred while the ship was engaged directly in icebreaking. In accounting terminology we would call that ratio the overhead rate. If the icebreaking and non-icebreaking costs were equal our overhead rate would be 100 percent. In other words, to approximate the cost of operating the icebreaker for a given period of time, we would simply double our estimated direct costs.

At Coast Guard in house maintenance activities, overhead is usually comprised of such factors as supervisory salaries, annual leave and employee fringe benefits; all costs similar to those necessary for the operation of our floating unit. The only difference is that industrial accounting systems separate and identify those costs we consider direct from those considered indirect, identifying the necessary indirect costs as overhead.

7. Industrial Activity

An industrial activity, for the purposes of this paper, is a government owned unit or division of a unit that has, as its sole purpose, the provision of maintenance or manufacturing services. In accordance with this definition, the Repair Division of AR&SC, the Coast Guard Yard, Account 19 Bases, smaller Maintenance and Repair (M&R) Bases and large shore facility Public Works Divisions are considered industrial activities. This paper treats In House maintenance activity and Industrial activity as synonymous.

8. Industrial Accounting

A system of recording, categorizing and presenting (in monetary terms) the results of an industrial activity's operations as they apply to the completion of assigned direct and continuous work orders. The reader is cautioned that this context refers not only to such accounting systems as are typically identified with congressionally approved working capital funds but to any

method of cost accumulation and reporting utilized in those environemnts defined above as Industrial Activities.

9. Fixed vs Variable Costs

Variable costs are those which vary in total in direct proportion to changes in the unit's maintenance activity level. Fixed costs remain constant in total through a relevant range regardless of changes in the unit's activity level.[9]

10. Controllable Costs

A cost which is reasonable subject to regulation by a supervisor, industrial manager or commanding officer of an industrial activity.[10] For example, the commanding officer of an industrial activity may have a certain amount of discretion with respect to a number of civilian production employees he retains on board at any given time. To the extent that he has this latitude, civilian personnel costs are controllable. The unit, however, may be required to retain an EEO specialist on the staff in compliance with Headquarter's policy. Since the Commanding Officer (CO) has no discretion over the existence of this position, the incumbent's salary is not a controllable cost at the CO's level.

11. Full Costing

The traditional method of accounting for production costs where the work order absorbs not only the direct costs associated with it but a "fair" portion of the indirect costs (or overhead) incurred by the industrial activity.[11]

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[9]Ibid., p. 22, 23.

[10]Ibid., p. 28.

[11]Ibid., p. 39.

12. Cost Distribution

The process of allocating costs incurred by the industrial activity to the work orders processed by the activity. Direct costs are distributed to work orders by definition. Indirect costs, however, must be allocated according to a formula which allows each work order to absorb a reasonable portion of overhead cost. In the Coast Guard industrial environment this allocation is made by means of the overhead rate.

13. Amortization (Depreciation)

The allocation of the total costs of physical plant and equipment to the periods the industrial activity benefited from having that physical plant and equipment available to provide maintenance services. Depreciation expenses, under current policy, are not distributed to the Coast Guard industrial work orders.

14. Fiduciary

In government the fiduciary concept pertains to the prohibition against incurring obligations or expenditures that exceed obligation/expenditure authority as conveyed in congressional appropriations, periodic OMB apportionments, or allotments from heads of operating agencies to heads of government installations.

15. Modal (Average) Cost

Having its origin in the statistical term mode (most frequently occuring event in a sample or population of events), modal cost for the purpose of this paper refers to the most frequently occuring cost or range of costs for a particular industrial operation or type of work. Examples might be the modal cost of rebuilding a small boats deisel engine, the modal overhaul cost of a particular class of aircraft or the most frequently occuring

range of labor costs to sand blast a buoy. Knowledge of such costs would be useful in the industrial environment for establishing performance standards or for work order cost estimating.

16. A-76 Review

A result of the policy established by Office of Management and Budget, Circular A-76 (1976, revised 1979) requires that the Federal Government rely upon the private sector for all goods and services except in the following four circumstances:

a. Services which are governmental functions (e.g., foreign policy).

b. Services involved with, or which impact upon military readiness.

c. Services which the government can perform at a lower cost.

d. Services which are not readily available from the commercial sector.

A-76 reviews require the performing agency to examine all services currently being provided in house against the four criteria above and to divest itself of those that do not fall within the listed exception categories. Services to be removed from the government sphere are to be replaced with commercial service contracts.

17. Revolving (Working Capital) Fund

A pool of funds established for the purpose of financing industrial operations. The intent is that the industrial activity's "customer" reimbursements will be returned to the fund for reuse thereby permitting continued operation much as a business' revenues provide a continuous flow of working capital to facilitate its operations.

E. ORGANIZATION OF THESIS

This study continues with four discussions, each dealing with one of the industrial environments alluded to earlier in this chapter. The discussions

examine the system or systems of accounting and financial control which impact upon these industrial environemnts, outline the mechanics of each system and describe the relevant management reports which the systems produce.[12] In each case the discussion continues with a listing of the information needs of the immediate industrial activity manager, the parent unit's commanding officer and one or more of the other higher level managers who have a direct interest in the industrial activity's operation. In conjunction with this listing will be a discussion of the reasons behind the expressed information requirements and an examination of how well each information need is met by the cognizant industrial accounting or financial control system.

These four major chapters will be followed by a brief but important discussion of the information needs of the Industrial Programs' sponsor, Chief Coast Guard Headquarters Office of Engineering, with some concluding remarks as to the level of success achieved by Industrial Accounting/Financial Control Systems as a whole and finally, with any recommendations this writer feels pertinent to the subject of future success of accounting/control systems in the Coast Guard industrial sphere.

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[12]This study will not deal with accounting systems which, although pertinent to the larger command with which the industrial activity may be associated, do not bear in particular on the industrial function.

II. AIRCRAFT REPAIR AND SUPPLY CENTER, ELIZABETH CITY, NORTH CAROLINA

A. BACKGROUND

The Coast Guard Aircraft and Supply Center (AR&SC) is one of five commands occupying space aboard Coast Guard Support Center Elizabeth City. Commissioned on 3 January 1947, AR&SC is unique in that it is the only Coast Guard unit responsible for comprehensive aviation rework and central aviation inventory control. Its specific missions, as stated in the Coast Guard Comptroller Manual (CG-264), are to:

1. Overhaul, repair and modify aircraft and aeronautical equipment.
2. Procure, stock, and issue aircraft supplies, parts, and aeronautical equipment.
3. Preserve, store and maintain replacement aircraft and parts.
4. Provide training for enlisted personnel in certain aviation ratings.[1]

The center itself is organized into six major divisions with 410 authorized personnel, most of whom are civilian employees. This chapter will deal primarily with two of those divisions, the Repair Division which performs the industrial function and the Supply Division which provides financial management, financial and cost accounting services, and supplies spare parts and replacement components.

By way of further introduction, it should be noted that current Coast Guard policy calls for all aircraft overhaul (except C-130's) and a significant

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[1]"Aircraft Repair and Supply Base," USCG Comptroller Manual, sec. K, chap. 01, p. K-5 K-16.

percentage of component rework to be performed at Elizabeth City.[2] Accordingly, the Repair Division's seventeen shops include all the skills necessary both to rebuild an aircraft from the ground up, given the correct parts, or to repair any individual aircraft component. Just what component repair is done in house is the decision of individual commodity managers attached to the Inventory Management Branch of the Supply Division. Although Repair Division costs are generally considered competitive with those of civilian contractors, timeliness is the primary consideration in deciding who does what component repair. Historically, AR&SC has provided the fastest service and is given priority on any component rework being scheduled by the Commodity Manager. The annual budget for performing these repair/supply and related functions was approximately $39 million for fiscal year 1979.

A second unique feature of AR&SC is that although it is in all respects an industrial activity, it differs from other Coast Guard and DoD industrial activities in its financing arrangements and its relationships with those it serves. One difference is that there is no working capital fund. Instead, the unit's operations are financed from an operating budget allotted from Coast Guard Headquarters. Although description of the budget formulation process is not the purpose of this paper, the budget process does have some noteworthy features for an industrial activity and knowledge of it will be important later on in this section. Accordingly, a brief description of this process is provided as follows:

1. Every Coast Guard aircraft is overhauled approximately every two years. The exact number and type of aircraft to be overhauled during the fiscal year

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[2]Components in this context may include such subassemblies as aircraft transmissions, gear boxes, engines, avionics systems, etc.

is negotiated between AR&SC and the Aeronautical Engineering branch of Coast Guard Headquarters. Based upon these negotiations, a required number of man hours and expected payroll cost is determined.

2. Analysis of historical data has shown that stock issues to the AR&SC Repair Division and other Air Stations will correlate closely with the expected number of flight hours for the entire Coast Guard air fleet. Using this data and an estimate of the number of components Repair Division will return to inventory for reissue, the number of new components to be purchased or items to be repaired by external contractors can be determined. This, of course, yields a dollar value estimate for parts/components issued.

3. The unit's Assistant Financial Manager computes an estimated overhead cost to cover staff salaries, administration and other miscellaneous activities and functions involved with operating the unit.

An amount satisfactory to cover unit operations as estimated by the three factors above is then allotted and the commanding officer is expected to perform all agreed upon overhaul and component repair within the budget limitation. There are no reimbursables in the system except for work performed on behalf of non-Coast Guard activities and no billing to customers. Generally the unit's only customer is Coast Guard Headquarters and it is Headquarters rather than the individual Air Station commanding officer who determines when an aircraft will be delivered to AR&SC for overhaul. Predetermined maintenance standards designate exactly what work will be performed on any individual aircraft rather than a description of work negotiated between AR&SC and the aircraft user. Thus, although AR&SC is an industrial activity, financing of its operations is accomplished in much the same manner as any other large non-industrial shore command.

B. ACCOUNTING AND CONTROL SYSTEMS

AR&SC has three distinct systems designed to provide financial and/or management control. The first is a financial accounting system which has, as its intent, to maintain records of new obligation authority, obligations to date, liquidations, expenditures and the like. As such it is quite typical of the type of fiduciary system the reader familiar with government accounting might expect. As the previously stated purpose of this paper is to concentrate on accounting and control as applied to and practiced in the industrial environment, this system will not be discussed extensively. Based on this writer's observations and the comments of personnel attached to AR&SC, the fiduciary system seems to accomplish its intended purpose in an adequate fashion.

The second system is a formal cost accounting system which, as mentioned earlier, is distinctive for an industrial type activity only in that it does not interface with a working capital fund.

The third system is a Production Control or, as titled by some AR&SC personnel, a Data Management System which, in this writer's experience, is unique in the Coast Guard having apparently been designed specifically for the needs of the AR&SC Repair Division and the Aeronautical Engineering Branch of Coast Guard Headquarters. The comments that follow briefly discuss the mechanics and management reports provided by the Cost Accounting and Production Control Systems.

1. Cost Accounting System

In that accountability for obligations and expenditures is primarily a product of the unit's financial accounting system, the AR&SC industrial cost accounting system has been described by those intimate with it more as a cost absorption system than an accounting device. Semantics notwithstanding,

the mechanism is nothing more than an uncomplicated illustration of textbook cost accounting. To illustrate, as a work order proceeds along the line, costs are absorbed and reported in the following steps:

a. Daily labor tickets which are annotated with the amount of time the employee spent on each individual job (by work order number) are prepared for each production line employee. Labor tickets are delivered to the Accounting Department and the day's labor costs are collected under the effected work order work in process accounts. Based upon this data, a monthly Labor Cost Report (Exhibit 2-1) is prepared for later use and analysis by comptroller personnel.

b. Parts and components required by the Repair Division are issued from Supply Division stock at the last recorded purchase price.[3] Inventory thus used is charged to the appropriate work order in the same fashion as was labor and is reported to the comptroller via a Monthly Work Order Billing Report (Exhibit 2-2).

c. Overhead is applied at a precomputed rate (currently about 140% of direct labor cost). The overhead amount is a product of costs absorbed from three different sources:

(1) Support Center costs must be allocated to each of the five tenant commands served by the Support Center.

(2) AR&SC staff salaries, computer services and administrative functions must be allocated either to the Repair Division, the Supply Division or the Training Division.

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[3]This is neither a LIFO nor a replacement cost system. Instead, the entire inventory is valued at the price paid for the component at its last acquisition. All repairable inventory once overhauled, is assumed to be of a value equal to the last acquisition price.

FORMAT
PAGE ONE

USCG AIRCRAFT REPAIR AND SUPPLY CENTER

MONTHLY LABOR COST REPORT
AS OF 11/30/77

1ST PAY PER. $	HRS.	2ND PAY PER. $	HRS.	3RD PAY PER. $	HRS.	4TH PAY PER. $	HRS.	CIV. PAY $	MIL. PAY $	OVERHEAD $	TOTALS CIV HR	MIL HR
WORK ORDER 0001												
WORK ORDER 0010												
WORK ORDER ????												

FORMAT
SUBSEQUENT PAGES

WORK ORDERS	CIV PAY	MIL PAY	OVERHEAD	CIV HRS	MIL HRS	S/H
6000-6024						
6025-6074						
6???-????						

EXHIBIT 2-1

U.S. COAST GUARD AIRCRAFT REPAIR & SUPPLY CENTER

MONTHLY WORK ORDER BILLING REPORT
30 Nov 1977

WORK ORDER LISTING

WONO	ST. ACC 1W	ST.ACC 1E	SS.ACC 2 AT 80%	ST.ACC 3	ST.ACC 4 AT 80%	ST.ACC 5	ST.ACC 9 AT 80%

Exhibit 2-2

(3) Production Division overhead which is comprised of supervisory, set up, clean up, holiday and idle/non-productive time must be attached.

Actual overhead allocations are the product of a formula developed by the unit's Assistant Financial Manager and subject to negotiation/approval by the Commanding Officer and affected division heads. Allocation bases are varied with number of personnel, floor space or usage being the most common.

Several checks and balances are included to ensure that costs are accurately recorded and reported. A number of clearing accounts, for example, are monitored to ensure that the system contains reliable information. Additionally, a Work Order Credit Account accumulates every dollar absorbed by work orders during the fiscal year. This is compared against and must equal the total of work orders completed plus or minus the decrease (increase) in work in process before the command can be assured that charges have been properly levied and absorbed.

Although the cost accounting system is relatively simple, it is complicated slightly by the fact that the system tolerates two costing methods. Process costing is utilized for repairable components by the assignment of all such components to continuous annual work orders, while separate job order costing is utilized for aircraft overhauls. This practice involves some reporting and analysis problems which shall be noted in greater detail later, but it does not appreciably complicate the cost assignment system discussed above.

Computations and cost assignments, of course, are only half of any cost accounting system; the other, more critical portion being the management reports provided. We have already briefly mentioned two such reports, the Monthly Work Order Billing Report and the Monthly Labor Cost Report. To these is added a Repairable Material Completed by Shops Report (Exhibit 2-3).

REPAIRABLE MATERIAL COMPLETED BY SHOPS FOR MONTH ENDING 30 NOV 1977

LINE NO.	DOC IDENT	STOCK NUMBER FSC	BINN	UI	QTY	DOCUMENT NUMBER RQNER	DATE	SERL	SUPPL ADRES	S	FUND CODE	PRI	REQ DEL	INV ACT	TYPE	UNIT PRICE	EXTENSION	LAST DATE
55		5895001602198		EA	1	E6204	7274	0525	00253		H2		306	6	2	2541.	2541.00	7293
I08		6695009375799		EA	1	E6333	7200	0527	00233		D2		314	3	2	1364.65	1364.65	7314
23X		6xxxxxxxxxxx		EA	x	E6xxxxxxxxxxx			xxxxx		Sx		3xx	x	2	xxxx	xxxx.xx	7xxx

Exhibit 2-3

Standing alone these three reports contain too much detail to be of any use to general management. Instead, their primary use is as source documents for a more highly aggregated presentation, the Monthly Summary Analysis of Cost Report (Appendix C).

Transcribed, aggregated and analyzed by hand by the AR&SC Accounting Branch, the Summary Analysis of Cost presents, compares to budget and analyzes all the costs incurred and absorbed by AR&SC each month and cumulatively for the year to date. Special emphasis is given to production costs associated with the Repair Division. Cost reports are also provided for two other commands located at the Elizabeth City complex, the Coast Guard Support Center and the USCG Air Base.

The Summary of Cost, which in its present form represents an evolutionary process affected by the stated information requirements of previous AR&SC managers, meets two needs. First, it is intended for use as an internal management report. Secondly, it is an external report of activities undertaken by AR&SC in behalf of its principal sponsor and customer, the Aeronautical Engineering Division of Coast Guard Headquarters. As an aside, those portions of the report that are prepared specifically for the needs of the Support Center and Air Base are provided as external reports to their parent command, the 5th Coast Guard District in Portsmouth, Virginia.

Major features of the Summary of Cost Report which are directed particularly at the AR&SC industrial function are:

a. Monthly and cumulative budget vs actual totals are provided for direct costs (broken down into labor, materials and fuel) and indirect costs (comprised of personnel related costs, test flying, supplies and materials, base/structural maintenance and redistributed staff costs).

b. Total monthly and cumulative dollar value is computed for the major categories of work performed; aircraft repair and overhaul and component rework.

c. Monthly and cumulative budgeted vs actual overhead incurred is computed with a comparison to overhead applied.

d. A monthly ratio of direct to indurect labor cost (Labor Utilization Ratio) is provided. Historical data examined over a period of several years has shown that the repair division is generally able to provide all planned overhaul/repair services within budgeted time and cost constraints when this ratio is at or above 60%. Monitoring this ratio, therefore, provides a quick and reasonably reliable performance indicator.[4] [17]

e. A percentage presentation of component repair cost divided by component dollar value returned to the Supply Division Stock Inventory is provided for a number of component classes. It is the unit's goal that this ratio be no higher than 30%. In monitoring it the unit uses the ratio as a measure of efficiency (although there are some problems with this use which will be treated later) and, it avails itself of a benchmark which indicates that a component is nearing the end of its economic life.

2. Production Control System

Repair Division production control is facilitated by monitoring the progress of each work order in accordance with a computer controlled Critical Path Network. Although there is only one critical path for the Repair Division function, the system in effect generates a separate Critical Path

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[4]Interestingly enough, a Labor Utilization Ratio of 60% seems to be a key indicator of efficiency for other Coast Guard industrial activities. Why 60% is a good figure for AR&SC is unknown (although it might be a good topic for further study) but at activities who operate under a reimbursable system, it represents that point at which reimbursable charges exactly cover costs.

Program for each aircraft entering the overhaul cycle. This accomodates the fact that each aircraft entering the system differs from others in terms of individual aircraft overhaul requirements. For example, one aircraft entering the cycle may have been operated enough hours to require an engine overhaul. A second may need no engine work at all but may have developed hull corrosion requiring skin or structural rework. Once an appropriate Critical Path Program is established however, the system monitors all work orders in the same manner. Mechanically, this is done as follows:

a. At the end of each work day, Repair Division employees turn in time cards annotated with the steps or operations performed, the time spent on each task and an indication as to whether or not the operation was completed.[5]

b. The day's work records are transferred to the computer which then updates the effected work orders with respect to the Critical Path. Standard component and labor costs are included in the system. Based on operations completed and man hours reported, the system makes cost extensions to provide a cumulative total of labor, overhaul and materials used on each project.

c. The system responds advising the manager how each work order is progressing according to its Critical Path and assists him in projecting where resources should be allocated for the following day. For example, the system may report that an operation on a given helicopter overhaul is well ahead of schedule. On the other hand, the Repair Division Manager may be aware of a pending demand from Supply Division for a particular type of repairable component. The Repair Division Manager is able to switch resources from overhaul to component rework taking advantage of manpower availability reported by the system.

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[5]Each unit of work recognized by the Critical Path as a complete operation is assigned a unique work code.

Currently the Production Control System is in a state of transition involving the acquisition of additional capabilities provided by the unit's procurement of a new Burroughs 6700 computer. As of 15 October 1979, remote terminals were to be placed in the Repair Division office to allow for rapid retrieval of data relating to man hours and production progress in almost any format required. A similar installation will ultimately be provided within the Aeronautical Engineering Branch of Coast Guard Headquarters.

As was the case with the cost accounting system, the Production Control System must be judged by the quality and usefulness of its management reports. The first reporting feature of note is the man hour simulation. Triggered by a Headquarters developed flight hour estimate, projected overhaul planning factors, and the Supply Division component inventory requirements, this program provides a measure of the labor hours required to complete the projected aircraft overhaul and component repair program for the following fiscal year. As previously noted, it is a primary tool used by the comptroller in determining the amount of funding required to pay for Repair Division labor services.

A second report which is produced and utilized internally is the Monthly Shop Analysis by Work Order Report. This document provides, for each shop, the man hour totals and total shop costs for each work order and for each month. A companion internal report, the Monthly Labor Report aggregates the same work order cost totals but by work order, listing the shops that have worked on the work order, the number of hours spent on the work order this fiscal year, the number of man hours used this month and the total labor cost accumulated. Formats for these reports are displayed as Exhibit 2-4.

A potentially more important report for both internal and external management is the Weekly Overhaul Status Report (Exhibit 2-5). It provides

FORMAT

DATE OF RUN
08/17/79
INDIRECT

USCG AIRCRAFT REPAIR AND SUPPLY CENTER
MONTHLY SHOP ANALYSIS BY WORK ORDER (HOURS/COSTS)

PM010
REPORT # 1
0001-0099

PAGE NO. 2

SHOP NO.	WORK ORDER	TOTAL MAN HOURS	TOTAL COST PER SHOP
111	0001	321.5	$2,219.67
111	0035	XXX.X	$XXXXX.XX
SHOP TOTALS		1,715.0	$11,743.54
130	1458	16.0	$179.20
130	1632	146.5	$1,640.80
*SHOP TOTALS		XXX.X	$X,XXX.XX

FORMAT

DATE OF RUN
08/24/79

USCG AIRCRAFT REPAIR AND SUPPLY CENTER
AIRCRAFT REPAIR DIVISION
PM030 MONTHLY LABOR REPORT (* HOURS *)
AS OF 31 JULY 1979

PAGE NO. 1

WORK ORDER	SHOP NO.	LIFE OF WO MAN-HOURS	MAN-HOURS THIS F/Y	MAN-HOURS THIS MONTH	TOTAL PER SHOP
1458	111		8,726.5	10.5	8,736.5
1458	130		56,376.4	108.0	56,484.4
* SUB-TOTALS *			XX,XXX.X	XXX.X	XX,XXX.X

EXHIBIT 2-4

DEPARTMENT OF TRANSPORTATION
U. S. COAST GUARD
CGARSC 5100-4 (7-75)

AIRCRAFT OVERHAUL STATUS REPORT
NOTE: OVERTIME WORKED SAT. 18 AUG 79

DATE 17 AUG 79
WORKDAY 1517

CGNO	CGIR	NET STATUS	CHANGE SINCE LAST WEEK	NET COMPLETION WORKDAY/DATE	ESTIMATED RFI WORKDAY/DATE	MASTER RFI WORKDAY/DATE	REMARKS	MATCHING INDUCTION R/D	PRI 3 ITEMS PAST	TENTATIVE ASSIGNMENT/ ORDERS TO
1041	1356	+25	+5	1505/1AUG	1530/6SEP	1531/7SEP	ENGINE REMOVED, BAD FUEL CONTROL	1439-1531/7SEP	9	MOBILE
1042	1426	+16	+5	1514/14AUG	1530/6SEP	1540/20SEP	MODIFIED T/R DRIVE SHAFT COUPLING INSTALLED FOR ENG. EVAL.	1441-1540/20SEP	12	HOUSTON
1043	1427	+8	+5	1523/27AUG	1531/7SEP	1549/30CT	HOLD STATUS NIS #2 T/R DRIVE SHAFT	1402-1549/030CT	19	MOBILE
1044	1443	+6	+5	1532/10SEP	1538/18SEP	1558/170CT	NIS #2 T/R DRIVE SHAFT		12	
10C3	1442	+10	+5	1541/21SEP	1551/50CT	1567/300CT	FUEL SYSTEM REQUIRED REMOVAL DUE TO FLOOR BOARDS MISALIGNED		12	
1045	1407	+5	+5	1552/90CT	1557/160CT	1576/13NOV	NIS AFT FUEL CELL		3	
1046	1405	0	0	1569/1NOV	1569/1NOV	1594/11DEC			0	
10C4	1464	0	0	1559/180CT	1559/180CT	1585/28NOV	HOLD STATUS AWAITING CRASH REPAIRS		0	
13C3	1480	+39	0	1482/28JUN	1535/13SEP	1515/15AUG	ELECTRICAL/ELECTRONIC PROBS DUE TO CRASH DAMAGE	1490-1519/21AUG	14	SITKA
13C4	1493	+44	0	1505/1AUG	1578/15NOV	157E/15NOV	MASTER RFI DATE RECOMPUTED AT COMPLETION OF CRASH STRUCTURAL REPAIRS	1471-1541/21SEP	11	ASTORIA
13C5	1483	+21	0	1529/5SEP	1550/40CT	1563/240CT	100% ELECTRICAL/ELECTRONIC WIRING, CONNECTOR REPLACEMENT.	1492-1561/220CT	28	N. ORLEANS
1384	1489	+10	+5	1552/90CT	1562/230CT	1585/28NOV	NIS REAR ENG. SUPPORT BUSHINGS		10	
1385	1457	+14	+14	1571/5NOV	1585/28NOV	1607/8JAN	RESCHEDULE NECESSARY DUE TO XMSN HARDMOUNT FITTINGS REPLACEMENT		1	
1386	1491	+1	0	1593/10DEC	1594/11DEC	1629/7FEB			0	
1501	5782			1547/10CT	1547/10CT	1547/10CT				

Exhibit 25

the progress of each overhaul vs the Critical Path Network, the estimated completion date vs the net's scheduled completion date and the expected arrival date of new inputs to the overhaul cycle.[6]

Probably the most important and comprehensive report generated by the Production Control System is the Work Progress Report (see Appendix D). This series of documents is actually five related reports which deal with such subjects as aircraft rework programs, direct/indirect hours and cost, and the final costs and hours for completed work. Most illuminating of the Work Progress Report series is the Aircraft Rework Report and the Completed Work Order Recap (Exhibits 2-6 and 2-7). Including much of the same data as the Weekly Overhaul Status Report, the Aircraft Rework Report adds cumulative and estimated hours on each job and provides a cumulative labor, materials and overhead total cost as of the end of each month. The Completed Work Order Report lists each work order, provides a brief description of the work performed, indicates the date completed, the number of days the item was in process, the total man hours used and provides cost totals for labor services, overhead and materials. The Work Progress Report series is distributed both internally to affected AR&SC divisions and externally to Headquarters Aeronautical Engineering Division.

C. MANAGEMENT INFORMATION NEEDS VS COST ACCOUNTING AND PRODUCTION CONTROL SYSTEMS

As the preceding comments clearly indicate, the Cost Accounting and Production Control Systems provide the manager with a wealth of information about the operation and costs of the industrial function at AR&SC. A valid

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[6]Important because when an aircraft is delivered to begin the overhaul process, an aircraft of the same class must be ready to take its place in the field.

Department of Transportation *PM110* Production *PM110* Page No. 1

U.S. Coast Guard Work Progress Report #1 - 1 October 06, 1978

Month Ending 31 July 78

Aircraft Rework	A/C No.	Estab-Lished Date	Est Comp Date	% Comp	Comple-tion Date	Manhours Expenced this month: Aircraft Maint.	Avionics	Cumul-ative	Estim-ated	$Labor $Overhead $Material

Total Man hours this month*

Monthly Man hour total**

Fiscal Cummulative Man Hour Total***

Exhibit 2-6

Department of Transportation *PM110* Production *PM110* Page No. 10

U.S. Coast Guard Work Progress Report #5 - 1

CG AISC 5000-20/12-72 Month Ending 31 July 78 October 06, 1978

Direct Labor Man Hours

Work Order No.	***Completed***	A/C No.	Compl Work Date	Days In Proc	Maint. Hours/ Cost	Avionics Hours/ Cost	Overhaul*** Hours/ Ovhd Cost	/ Cost	Net Material Charges	Modification Hours/ Cost	Total Hours/ Cost

Exhibit 2-7

concern, however, is whether or not the information provided is the information management needs or wants. This question was first raised and, to an extent, answered in a 1974 report to the Commanding Officer authored by LCDR's Richard W. Zins and Edward E. Demuzzio.[7] The recommendations of this report were apparently never implemented and, in a conversation this writer recently had with AR&SC's executive officer, it was made clear that a comprehensive listing of management's information needs is still something that is lacking. Although this document certainly does not isolate every information need of AR&SC management, it is believed that it presents a listing of the majority of the information needs of four management levels as those needs apply to the industrial function. The following section then, will deal with the needs and uses for information of the management of the Repair Division, the Comptroller, the Commanding Officer and the Aeronautical Engineering Division of Coast Guard Headquarters. Research conducted with respect to this issue indicated in some cases that more than one of the four levels examined required a given item of information. Where overlap occurs the information requirement will be discussed in detail only once but the text will mention the other levels that claim a need for the same information.

1. Repair Division Information Needs

a. Individual Costs of High Dollar Value Components

As noted earlier in this chapter, component repair is costed on a process costing basis. For small dollar value items, some of which may individually be worth in excess of 100,000 dollars, the command has experienced a need to capture the repair costs of components on an individual basis.

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[7]LCDR's Richard W. Zins and Edward E. Demuzzio, a memorandum to the Commanding Officer, USCG AR&SC, Subj: ARSC Accounting System Review, 1 May 1974.

The reasons this information is required are varied but three are worthy of specific note. They are:

(1) The information is requested of the command by Coast Guard Headquarters and other federal agencies.

(2) The repair requirements for large dollar value components, like those of individual aircraft, differ greatly depending upon the component's age and its condition upon arrival at AR&SC. For example, a component may have been in the repair shop one month or six months and the resultant unit repair costs could be expected to be widely variable. The command does not feel that a simple arithmetic average of cost over some period of time gives an accurate picture of what it "normally" costs to repair that type of item. A truer indication of AR&SC's component repair costs is necessary for two reasons. First, there is continuing scrutiny from within the Coast Guard and without to compare AR&SC's costs against the many private firms capable of doing aircraft and component rework. Secondly, given the fiscal constraints that exist, AR&SC needs to know what it does well and what it does poorly. Like a business, the management of AR&SC desires to put the funds made available to it in those areas where the greatest return in terms of cost effectiveness will be realized and to abandon the less cost effective work to firms who are better capable of providing more economical service.

(3) The availability of individual component repair costs can be beneficial in monitoring performance and highlighting problem areas. Under the current system, with no reporting by individual components, we do not find out, for example, that a component has been sitting in the repair shop for several months for want of a small part (washer, o-ring, etc.). Armed with such information, the manager can investigate and attend to the root causes of the problem where previously those causes went undetected.

Clearly the cost accounting system does not respond to management's needs in this area. The command considers this as a minor problem in that the skill and computing capability exist in house to correct it fairly expeditiously.

b. Accurate Total Periodic Component Repair Cost for the Division

One of the potential performance monitoring tools Repair Division managers could use is an accurate periodic cost and level of effort measurement for component repair. Under the current system, component repair effort is accounted for only when work is complete and repaired items are returned to Supply Division inventory. With no component "work in process," the unit finds it difficult to track comparative costs from period to period or even to designate the accounting period with which costs are really associated.

c. Overhaul Cost by Aircraft Side Number

Repair Division itself is not particularly cost conscious in terms of completing a given aircraft overhaul within budget limitations for an individual work order. Instead, their focus is to complete the overhaul competently within the allotted time limitation. Coast Guard Headquarters is interested in what any single overhaul costs for the purpose of making budgetary and airframe retirement decisions, and it depends upon AR&SC Repair Division to provide that information. The Production Control System's Work Progress Report, Aircraft Rework and Completed Work Orders sections seem to respond adequately to that need.

d. Estimated Repair Cost by Side Number Before Work is Begun

As mentioned above, projected or even actual overhaul costs for any single aircraft are not critical information items as far as the Repair Division is concerned. Again, it is an item Headquarters frequently requires of them, particularly when the expected overhaul/repair is the result of a

crash situation. In order for the Repair Division to respond, it needs two types of information. First, a review of the affected aircraft's maintenance/overhaul records must be conducted. Secondly, repair records for aircraft introduced in similar condition must be located and cost data reviewed. Side number maintenance records are kept manually in the Repair Division office. Because the Coast Guard air fleet is small, someone in the Repair Division can usually remember an aircraft having been introduced in similar condition. Neither of these items is a product of either the cost accounting or production control systems, therefore, significant manual effort is required to produce them.

e. Accurate Records of Man Hours Used

The Repair Division claims a need for accurate man hour records by work order and by aircraft type. There seems to be three primary uses for this information:

(1) As stated earlier, the Repair Division sees its primary responsibility as meeting time schedules. Man hours actually utilized is an indicator of progress against the schedule and of course the Production Control System's Critical Path Program as it is fed by the daily labor ticket provides a more than adequate daily monitor of progress against time limitations. The Monthly Labor Report, Monthly Shop Analysis by Work Order and the Weekly Aircraft Overhaul Status Report all augment the Critical Path System in this regard.

(2) Man hour usage is important for making annual budget projections. Again the Production Control System provides for this need via its man hour simulation. Presently, there is no indication that actual man hour experience has been used to update the simulation package.

(3) As noted earlier, the unit would like to be able to more accurately estimate the time to allot a new job based on past records of work for

aircraft or major components that have entered the system in similar condition. Such information would be of value not only for the crash introductions mentioned earlier but for better control of regularly scheduled work. Although accurate records of actual man hours utilized on past work is a feature of the Work Progress Report, accessing the desired past work order data is entirely dependent on manual searches and human recall.

f. Impact of Unscheduled Work on Scheduled Work

A budgeted number of hours are normally set aside for non-programmed/unscheduled work such as crash repair. Comments of Repair Division personnel indicate that this amount never seems to be adequate to cover actual occurrence. The Production Control System has the capability to recall historical data on the amount of unplanned time utilized but does not include a statistical analysis or projection capability. Similarly, the inability to quickly recall past repair data for aircraft of similar entry condition makes it difficult to project accurately the impact of unplanned arrivals on existing planned work. In terms of coordination between field units desiring to deliver an aircraft for overhaul and retrieve a completed unit and, AR&SC management who must plan labor allocation and arrange for overtime, such projection ability would be extremely helpful.

g. Data to Justify the Need for Additional Capacity and Equipment

Long lead times experienced in the procurement of many critical components, high manufacturer quotations in excess of what AR&SC believes it could manufacture or repair the same components for in house, and the rapidly increasing costs of electronic test equipment have prompted some levels of management to conclude that there is a need for increased Repair Division capacity in some areas. In order to economically justify this increased capacity, accurate comparative cost data is needed. Although both the Cost

Accounting System and the Production Control System seem capable of providing comparative data for aircraft overhauls, and in the aggregate for major components (see page III-2, Appendix C), the lack of true comparative data for individual component types mentioned before restricts somewhat the unit's ability to fully justify its additional capacity needs.

h. Data to Make Recommendations Regarding Overhaul/Maintenance Policy

The standards upon which AR&SC is asked or feels compelled to comment upon are generally those set by a manufacturer or are somehow related to safety of flight considerations. The recommendations are of two types:

(1) Whether or not to scrap an aircraft. To make this recommendation, the Repair Division needs to know the cost of the last overhaul, which is available from the completed work order section of the Work Progress Report, and the expected cost of the next overhaul. This of course is likely to be determinable but as previously discussed, not without a good deal of manual effort.

(2) To change an overhaul guideline. For example, a component may require replacement every 1,000 hours. AR&SC experience may have shown little wear to the component at 1,000 hours and it feels confident recommending that the overhaul standard be changed to 1,200 hours. Obviously, neither the Cost Accounting or Production Control Systems provide the information to make such a recommendation nor should they realistically be expected to.

2. Comptroller Information Needs

The Comptroller's information needs fall into two major categories. First, since there is no internal review or management analysis staff at AR&SC, these functions have been assumed by Comptroller personnel. The unit's Assistant Financial Manager seems particularly interested in this area.

Secondly, the Comptroller needs information relative to budget justification and preparation. The following comments discuss the specific information required for the Comptroller staff to perform these two functions.

a. Information Needed to Perform Management Advisory and Internal Review Functions

The Comptroller staff seems to see four requirements for information in this area. They are:

(1) Information Needed to Control Product Costs. Almost all of the reports discussed earlier in this chapter have included some type of cost data, much of which clearly dealt with AR&SC's products, aircraft overhauls and component rework. In order to control product cost, we must have some idea what those costs should be. In that regard only the Summary Analysis of Cost (page III-2, Appendix D) compares actual costs to some normative benchmark by listing for the main component classifications, actual vs standard component overhaul costs and repair cost per dollar value of component returned to inventory. Even the Summary Analysis is deficient, in that it lists no budget figures for the principal product, aircraft overhaul.

In fairness, it should be recognized that with each aircraft and component entering the system in significantly different condition, it is difficult to arrive at a standard cost per overhaul which could be used for control purposes. Certainly, standard costs for common operations could be developed and reported. The Summary of Cost does report a budget vs actual cost for the Repair Division as a whole and a case could be made for that as a reasonable surrogate for control of product cost.

(2) Information Required to Provide an Indicator of Cost Trends, to Highlight Cost Related Problem Areas and Measure Effectiveness/Economy in Industrial Operations. The Summary of Cost Report lists three measures that

attempt to serve those purposes in the form of the Labor Utilization Rate (discussed earlier in relation to its historical correlation with efficiency), a disclosure of the overhead rate and overhead trends, and finally a current to preceding year comparison of the component repair to inventory value ratio.

(3) Information Required to Make Recommendations on Make/Buy Decisions for Components. From the Comptrollers point of view the information needed to make these recommendations is basically the comparative cost data previously discussed at length. Interestingly enough, however, cost seems to be at least third in importance of the factors that go into making the decision as to whether component work is done in or out of house, the more important considerations being timeliness and AR&SC capacity.

(4) Information Necessary to Maintain Fiduciary Control. Fiduciary control as noted in the beginning of the chapter is not directly tied to the Cost Accounting System . It is maintained via an annual financial plan which is compared against actual expenditures as reported in a Monthly Fund Code Report (Exhibit 2-8).

b. Information Required to Perform the Budget Preparation and Review Function

Since the AR&SC Budget Cycle has already been covered, there is no need to repeat the subject but it is useful to list the information Comptroller personnel find necessary for budget preparation.

(1) Projected Repair Division Returns of Repaired Components to Inventory. The Repairable Material Completed by Shops Report provides an historical record against which future returns may be estimated.

(2) Projected New Inventory Purchases. This factor is neither a product of the Cost Accounting nor Production Control Systems. Instead it is simply an historically observed percentage of expected inventory issue, extracted from inventory records.

U.S. Coast Guard
Aircraft Repair and Supply Center

Fund Code Summary for Month Ending 30 Nov 1977
For fund code G2-F1-F3-&-F4

Document Number	Stores Acct	Fund Code	Quantity	Unit Price	Extension	Caption

Total for Sup Addr

Exhibit 2-8

(3) Historical Costs of Outside Overhauls. This information is extracted from memorandum records of past overhaul data kept by the Assistant Financial Manager. It is not a product of either of the accounting or Production Control Systems.

(4) Projected Flight Hours. This data must be provided by Coast Guard Headquarters.

(5) Projected Man Hours. As discussed previously, a product of the Production Control Man Hour Simulation Program.

(6) Part Issues by Type of Aircraft. Available from inventory issue records. Not a product of the Cost Accounting System.

3. Command Information Needs

a. What is the Cost Per Item to Repair High Dollar Value Components?

Covered under "Repair Division."

b. What is the Average Cost to Repair High Value Components (By Component Type)?

As discussed under "Repair Division," the peculiarities of any single component overhaul may so bias the total periodic component overhaul cost that a simple arithmetic average of these costs would be meaningless. What might be more meaningful is a modal or most frequently occurring range of overhaul costs. Such a figure can be computed only if there is separate identification of individual component repairs.

c. Are We Absorbing a Proper Allocation of Support Center Cost?

To reduce costs allocated to products, the unit Commanding Officer may reduce staff size or take other appropriate internal measures but he cannot control the discretionary costs associated with running the larger Support Center. These "uncontrollable" costs are of concern to the AR&SC command because a portion of them, through allocation, find their way to the

Repair Division and ultimately to the cost of overhaul/rework services, the measure against which AR&SC management is frequently compared to private industry.

The Summary Analysis of Cost Report clearly lists the dollar value of Support Center cost being allocated to AR&SC but neither it nor the Production Control System is capable of addressing the more central question as far as the command is concerned, i.e., whether the amounts allocated are appropriate. The command currently feels that the present system of allocations are not, but the issue can only be resolved conclusively through separate research, which it seems the unit's internal talents are capable of performing.

d. Information Is Needed To Show That AR&SC Is Or Is Not Competitive With Private Industry For Purposes Of Any Future A-76 Reviews.

The basic requirement to successfully meet such a review is simply an honest and comprehensive cost accumulation system which, with the exception of the deficiencies mentioned earlier, the existing cost accounting mechanism is capable of providing. It is expected in some circles, that Future A-76 Reviews will include a requirement that government costs include the amortization of capital assets. To meet this requirement, a listing of the capital asset acquisition value, acquisition date and improvement costs will be necessary, along with the addition to the Cost Accounting Svstem of the capacity to accumulate amortization charges.

e. Information Is Needed To Determine How To Apply Scarce Resources In The Most Effective Way.

One example listed by the command as being illustrative of this area of concern was the repair vs replacement decision. While the Repair Division was confronted by this question in relation to individual aircraft, the question could also be raised relative to major components. To an extent,

the Repair Cost Per Inventory Dollar Value Returned Ratio reported in the Summary of Cost Document confronts this question, but the ratio is reported for broad categories of component only, not by specific component type. As will be discussed in more detail later, the ratio might also be more meaningful in making a replacement decision if the return value used in computing the ratio was replacement cost vice last recorded acquisition value. Other questions under this category for which the command expressed a need for information were:

(1) Given Constrained Resources and Multiple Demands for Service, Which Demand Do We Respond to First? For example, is it more beneficial to the Coast Guard to apply resources on component rework or aircraft overhaul? On a day to day basis, the Critical Path feature of the Production Control System addresses this question but neither Production Control nor Cost Accounting System seems to attack the issue in the strategic sense the command perceives as important.

(2) What Would the Effect of Alternate Production Strategies Be? One such possibility expressed was the performance of component rework in some sort of economic order quantity vice piece meal, on demand, or as time is available as is done now. Again, neither existing information system confronts the costs or benefits of such a possibility but perhaps an Operations Research technique might.

f. Information is Needed to Prepare and Justify the Annual Budget.

Covered Under "Comptroller."

g. Information is Needed to Allow the Command to Participate in Long Range Decisions Regarding the Future of AR&SC.

Although most strategic decision making is done at Coast Guard Headquarters, the unit is an active participant in those decisions. Accordingly, some of the concerns on the mind of the AR&SC command include such

questions as is it cost effective for AR&SC to remain in business, what will the impact of new classes of aircraft be on AR&SC's product mix, on financing and budgeting procedures, on the labor force and what new capital assets will be required to respond to the change in product demands?[8] Again, neither the Cost Accounting System nor the Production Control System directly confronts these questions but, the Cost Accounting System, with modifications, is capable of identifying those tasks AR&SC performs efficiently and cost competitively. In so doing, it can provide some of the input needed to make the strategic decisions mentioned.

h. Information is Required to Judge the Productivity of the Industrial Labor Force.

Contact with the present Commanding Officer and XO as well as the author of the Summary of Cost Report indicated that over the years the command has sought to investigate industrial productivity in five areas. They are:

(1) Expected Man Hours to be Utilized vs the Total Man Hours Actually Utilized. As the reader will remember, the projected man hours to be utilized for any fiscal year is a product of the Production Control System's simulation program. Actual hours utilized cumulatively and for any month is reported both by the Work Progress Report (for aircraft overhaul) and in total by the Monthly Labor Report. The Work Progress Report also provides a monthly look at estimated vs actual man hours on individual work order basis. Although it is clear that the system makes most of the desired man hour information available for the Commanding Officer, it is deficient in that a good deal of manual searching is required to obtain a clear understanding of the expected vs actual position of the Repair Division as a whole. A simple

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[8]Product mix can be defined as overhaul vs component rework, in house repair vs contract out, task A vs task B given constrained resources.

index disclosing the expected man hour utilization for any point during the fiscal year vs the actual utilization might be helpful in this area.

(2) Expected Tasks to be Performed vs Actual Completed Work. As previously mentioned, the budget process generates figures for the number of aircraft overhauls to be performed and repairable components to be returned to inventory. A scan of the Weekly Aircraft Overhaul Status Report's Net Status column is probably as quick and accurate an indication of the actual progress of aircraft through the production line as is needed. Much of the same information can be extracted from the Monthly Work Progress Report. Regrettably, the only way similar information can be provided for component rework is to manually add the shop totals from the Repairable Material Completed by Shops Report (a somewhat tedious and time consuming task) and compare progress against budget figures.

(3) Overhead Rate Trends. Although the current Commanding Officer sees the overhead rate more as a function of organizational structure than performance, the majority of past Commanding Officers expressed interest in the trend in the overhead rate as a measure of performance [17]. Budgeted vs actual overhead is a product of the Cost Accounting system and is computed and reported in the Summary of Cost Report for the fiscal year. Comparative trends are usually reported in the annual budget submission but not in any of the regular monthly reports.

(4) Ratio of Direct to Indirect Costs. Direct and indirect costs are reported as part of the Summary of Cost Report. The ratio is not reported but is easily computed.

(5) Ratio of Direct to Indirect Labor Cost. A regular part of the Summary of Cost Report.

4. Headquarters, Aeronautical Engineering Division Information Needs

a. Overhaul Cost by Aircraft Side Number.

Covered under "Repair Division."

b. Past Cost of Supply Support.

Cost of inventory stocked and distributed by AR&SC is part of the unit's inventory accounting mechanism although it is not a part of either the Cost Accounting or Production Control Systems.

c. Estimated Number of Flight Hours for the Next Fiscal Year.

This data must be provided by sources external to both AR&SC and the Aeronautical Engineering Division. Normally the data is provided by the Coast Guard's Office of Operations.

d. Direct and Indirect Overhaul Costs by Aircraft Type.

Information is required by aircraft type simply because most aircraft related decisions in Headquarters are made by aircraft type. For example, in reviewing overhaul costs by class of aircraft, the Aeronautical Engineering Division might detect a higher than expected overhaul cost for a particular group of Short Range Recovery helicopters (SRR) operating in a common environment. Through investigation they might conclude that the SRR is not durable enough for that operating environment. They are in a position to recommend acquisition of a more suitable aircraft. Both the Summary of Cost Report and the Work Progress Report do accumulate overhaul cost data; the Summary of Cost as an overhaul total and the Work Progress Report by individual aircraft. Neither report provides the desired cost analysis by aircraft type, either for the current year or as a modal average. This information could be developed from the data presented in the Work Progress Report but only after considerable manual computations.

e. Total Aircraft Cost by Flight Hour.

While AR&SC's inventory issue and Repair Division cost can provide one of the components to compute a partial cost per flight hour, many other costs (such as local operating cost, pilot training, fuel, etc.) pertinent to a total dollar per flight hour figure would also have to be provided. These, of course, are not recorded or reported by AR&SC.

f. Information is Required to Evaluate AR&SC Management.

Most of the indicies used by the Aeronautical Engineering Division to evaluate the management of AR&SC command, AR&SC itself uses to evaluate the performance of its own Repair Division. Among data desired are the ratio of overhaul cost to component acquisition cost provided in the Summary of Cost Report, labor use efficiency as reported by the Summary of Cost's Labor Utilization Ratio and Measures of Overhaul Progress as reported in the Weekly Aircraft Overhaul Status and Work Progress Reports.

g. Information is Required to Decide Whether AR&SC or Outside Sources Will be the Primary Maintenance Source for New Classes or Aircraft Entering the Fleet.

Three decision variables go into making this evaluation. First, it must be determined if AR&SC has the technical capability to absorb a new aircraft. Secondly, what is the present level of labor/physical plant utilization? Can a new aircraft be absorbed? Finally, what are the expected comparative costs between outside contract and AR&SC? Of these three considerations, only the past record of comparative costs as reported by the Cost Accounting System is information AR&SC potentially can provide.

h. Comparative Cost Information by Years.

Potentially valuable for both strategic decision making and management evaluation, only the Component Repair to Inventory Value Ratio included in the Summary of Cost Report is provided on a yearly comparative basis and

then only for the immediately preceding fiscal year. As was the case with the need for information by aircraft type, data to make annual comparisons is included in several existing reports but must be manually retrieved. Additionally, any dollar value comparisons must consider the changes in the purchasing power of the dollar to be meaningful.

i. Information is Required to Justify Additional AR&SC Capacity.

Covered under "Repair Division."

j. Information is Required on Quality and Durability of Components.

Although components used in Coast Guard aircraft are interchangeable, some components are the product of more than one manufacturer. The Aeronautical Engineering Division desires to follow up on those components in terms of which manufacturer's component experiences more frequent breakdowns, needs more frequent overhauls and required more extensive overhauls. Where components have been repaired by sources outside AR&SC, the same information is desired by vendor. Neither the Cost Accounting nor the Production Control Systems records or reports this type of information.

D. CONCLUSIONS, RECOMMENDATIONS AND PROBLEM AREAS

As the preceding comments have shown, much of the information required by the four levels of management studied is at least potentially provided by either the Production Control or Cost Accounting Systems. Many of those areas not provided for by the two systems are either developed through other means or are of a strategic decision making character, not completely consistent with the intent of either system. During the course of this writer's investigation of these systems and their applicability to the needs of those concerned with AR&SC management, a number of problems surfaced which are felt to be of sufficient magnitude to warrant separate treatment. They are discussed as

follows:

1. Of the five commands operating out of the Elizabeth City Support Center, only AR&SC is conscious of and responsible for its costs. While some costs are collected and reported for the other command entities, only AR&SC maintains a Cost Accounting System that attempts to assign the full cost of operations (including costs allocated from the Support Center) to the "products" that constitute its mission. If AR&SC's products are perceived as not being cost competitive, management actions would be scrutinized and pressure might be brought to bear to put the unit out of business. In contrast, if a component of the Support Center (the Public Works Division for example) is excessively costly there is no penalty. Its costs, no matter how high they become, are simply allocated to other operating units like AR&SC who are captive customers. Clearly there is little incentive for the Support Center to hold down costs when all of its costs can be allocated elsewhere. A solution to this problem might be to make the Support center as cost responsible as is AR&SC or to allow AR&SC the discretion to seek some of those services (e.g., Public Works Service) from the civilian community.

2. There is a problem with the timeliness of the Summary Analysis of Cost Report. Of the more than forty distinct information requirements discussed above, twenty of those requirements (assuming necessary system modifications can be made) are, at least in part, satisfied by the Cost Accounting System and reportable via the Summary Analysis of Cost Report. Herein lies one of the most severe problems AR&SC seems to have. Where none of the managers interviewed for this thesis felt he could wait more than about ten days past the end of any monthly reporting period for cost and performance related information, the lead time to prepare and publish the Summary of Cost Report is currently approaching two months. The principle reason for this delay

seems largely due to the fact that the report is manually prepared. In this writer's opinion, there is little justification for this practice. AR&SC's present computing capacity is more than adequate to handle the load that would be presented if the Summary of Cost were machine prepared and clearly, the Summary of Cost's importance would justify the effort that would be necessary to convert to a computerized format.

3. There is a feeling among some managers that the Summary Analysis of Cost Report is overly complex. As Appendix C discloses, the Summary of Cost Report provides a wealth of information. The report provides numerous budget vs actual expenditure figures, several performance indices, tracks cost allocations and aggregates costs into meaningful categories. Regrettably, most AR&SC managers see the Summary of Cost Report as just too much detail to be used as a meaningful tool on a day-to-day basis. It was the Comptroller's impression, for example, that few managers understand any of the measurements provided unless they are walked through the report by someone intimate with it. Further, no one at AR&SC was aware of the portions of the report that were of interest to Headquarters and the data contained in the report was seldom if ever discussed among the AR&SC senior staff. Probably the most telling commentary on the complexity and time delay problems associated with the Summary of Cost Report was provided by the current Commanding Officer when, asked to list the decisions made using Summary of Cost data, simply replied, "None."[9]

4. There are difficulties with the computation and use of the Component Repair Cost to Inventory Repair Cost Ratio. The reader will probably recall that this index, as reported in the Summary of Cost Report, is frequently used

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[9]Interview, Captain Cecil Berry, CO of AR&SC, Elizabeth City, North Carolina, August 28, 1979.

as a monitor of Repair Division performance. Such a usage is a problem, however, whenever the item (which is valued at its last purchase price) is infrequently replaced from commercial sources. One of several such examples is aircraft gear boxes. After initial acquisition, few are ever bought because the units are, for our purposes, infinitely rebuildable. As time passes and labor and materials costs increase with inflation, the index for this type of item superficially indicates inefficiency because while the inventory value is still a reflection of say, 1965 cost, the repair charges are reflected in 1979 dollars; a different unit of measure altogether. Valuing inventory at replacement cost or adjusting the dollar measurements for such items to reflect current purchasing power would provide a more meaningful use of the ratio.

5. Overhaul costs are not reflected in the costs of running field commands. No one contacted in the course of this study argued against the concept that a part of the true cost of operating any Coast Guard Air Station is the cost of periodically overhauling its assigned aircraft. Under the AR&SC Cost Accounting System, however, all costs are absorbed by AR&SC with no distribution to benefiting units. As such, the cost of running any Air Station is always understated. The reason that field units are not allocated a portion of overhaul cost is that the field command seldom gets back the aircraft it turned in for overhaul. The item it does receive may be older or in less satisfactory condition than the one it relinquished. As such its subsequent field maintenance and next overhaul costs would be higher and the feeling is that we would be penalizing the field command because of the item it drew from inventory, rather than accurately costing on the basis of expenditure actually generated by the unit.

Despite the existence of the problems listed above, there are some noteable strengths to the AR&SC system of Cost Accounting and Production Control that

no examination of AR&SC operations would be complete without mentioning:

1. While the AR&SC Cost Accounting System provides the advantage of heightening cost and economy of operations awareness, it is not burdened with the administrative concerns inherent in the reimbursable systems more typical of government industrial activities.

2. AR&SC is mission rather than dollar oriented. To clarify, the reader should recall that the AR&SC budget is based principally upon a negotiated number of overhauls to be completed during any given fiscal year. The unit is judged primarily on its ability to comply with the agreed upon overhaul schedule. As such there is no dollar value the Commanding Officer feels he must spend to justify the same level of funding next year. This characteristic is felt to mitigate against irrational or unnecessary end of the year spending.

3. Because a decision has been made to, in effect, utilize AR&SC whenever possible, it operates at nearly 100% utilization every year. Overhead is thereby distributed among the maximum number of aircraft or component units and costs per unit are minimized. Clearly this is a factor in AR&SC's apparent cost competitiveness vs contractors.

III. COAST GUARD SUPPORT CENTER PORTSMOUTH, VIRGINIA INDUSTRIAL DIVISION

A. BACKGROUND

Coast Guard Support Center Portsmouth, Virginia, is one of a number of multifunctional shore commands which have as their mission the:

1. Maintenance, repair and modification of Coast Guard small boats, vehicles machinery, engines, aids to navigation equipment, designated shore stations and minor repairs and modifications to Coast Guard vessels.[1]

2. The operation of attached small craft and provision of mooring and utilities services for larger Coast Guard vessels.

3. Preservation, storage, maintenance, stocking, issuing and shipping of aids to navigation equipment, Headquarters controlled material and other equipment and supplies.

4. Provision of offices, shop space and personnel services for tenant commands and berthing/messing for transient personnel.

The Portsmouth Support Center had its origins as a Lighthouse Service Depot in the 1820's near what is now the downtown area. The Depot grew at that location acquiring many of its present industrial responsibilities and eventually becoming the base of operations for several aids to navigation vessels which services the Tidewater area. During the mid-1970's, it was decided to relocate what by this time had become known as Base Portsmouth to more spacious surroundings near the Naval facility at Craney Island and to co-locate with the Base several of the other somewhat dispersed area Coast Guard functions. The

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[1]Commonly identified as being the industrial functions.

resulting facility in 1977 was commissioned as Coast Guard Support Center Portsmouth. Besides performing its original Base/Industrial functions, the Center now houses Coast Guard Group Hampton Roads (an operational/Search and Rescue organization) and it acts as home port for a number of the Coast Guard's major east coast cutters.

The Support Center's Industrial Division, with which this chapter principally deals, now provides such services as buoy repair/maintenance, small boat repair and overhaul, diesel engine overhaul, and structural, electrical and electronic maintenance for units throughout the Fifth Coast Guard District. Sixty-two employees (most of whom are civilian) perform these services, generating an average payroll cost of approximately $3,000 per day and expending an annual industrial budget of about 1.5 million dollars.

Portsmouth is unique in that it is one of the few Coast Guard activities to have been completely planned and constructed from its inception for use as a support facility. This has been particularly advantageous for the industrial operation which has benefited from a modern, well equipped and efficiently laid out physical plant. Interestingly, the new facility seems to have been complemented by an equally progressive industrial management staff who, in the last several years, have gained a reputation throughout the Coast Guard for their development of financial/efficiency techniques and their continuing attempts to mate existing industrial accounting mechanisms with electronic data processing.

B. ACCOUNTING AND FINANCING SYSTEMS

Although, like the Aviation Repair and Supply Center, Support Center Portsmouth's industrial activities are not financed from a permanent revolving fund, Portsmouth contrasts with AR&SC in that its system of accumulating and reporting industrial costs is very closely interfaced with existing financial accounting

mechanisms and budgeting methods. The cost accounting system the Support Center does employ is known throughout the Coast Guard's engineering and financial communities as Account 19, a system which accumulates industrial costs in a holding account, clears those costs as actual expenditures are recognized and distributes work order charges to those units who have benefited from the industrial facility's services. It is probably the most frequently encountered of the Coast Guard's industrial accounting systems and is presently in use at seven major shore installations.

The comments that follow describe the method of obtaining industrial operating funds under this system and in somewhat greater detail, the system's cost accounting mechanisms.

1. Financing

With the exception of reimbursable funding obtained for services provided for non-Coast Guard operations, and from non-operating expense fund sources, all industrial operations are paid for by the District Support Managers for Naval, Civil and Electronics Engineering. Determining how much the actual level of funding will be and what magnitude of activity the funding will support each year is a parallel process which involves both the District and the Support Center's industrial Division.

From the District Support Manager's point of view, the process works as follows:

a. The Coast Guard's Operations and Maintenance (O&M) appropriation is divided into several subdivisions known as Operating Guides (frequently called OG's). Among these subdivisions are five administrative reservations which are set aside for the funding of engineering support. Each is managed by one of the Headquarters Engineering Support Managers.

b. Districts and Headquarters controlled units compete for operating fund allotments which are financed through contributions from all of the various Obligation Guide Managers, those who manage Engineering Support Obligation Guides as well as those managing non-Engineering Support OG's.[2] Although the Engineering Support OG managers contribute with the intent that all of their contributions will be available to their district counterparts, these contributions are not firm reservations. Instead, their sum constitutes the District's operating budget and the District Commander may reaggregate the contributions as necessary. Normally, however, the Headquarter's contributions survive intact and corresponding Engineering Support Obligation Guides are established on behalf of the District Engineering Support programs.

c. As maintenance requirements become known throughout the year, Engineering Support Managers establish these needs on a formal backlog. Normally, a backlog file has been created for each pending project including a description of work required, a cost estimate and occasionally some preliminary design information. As the District's budget formulation process begins, this backlog is searched by the Engineering Support Manager and his staff for projects which meet the requirements [Chapter I] for assignment to the industrial activity.

d. The selected backlog items are collected and coordinated, either by the District Industrial Manager or the Chief of the Engineering Division, into a tentative industrial program for the upcoming fiscal year. This tentative

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[2]Little or no contribution is made to Districts from OG-41 (Aviation). The bulk of this Obligation Guide is set aside for the funding of AR&SC and the remainder is retained under Headquarter's control. Accordingly, there are no District Aeronautical Engineering Support Managers.

program may be modified if it seems to be inconsistent with historical levels of funding or if it appears insufficient to keep the industrial workforce busy.[3]

At the same time, and largely independent of the District, the industrial activity is preparing its own tentative program. This process is much like that employed by AR&SC and it is accomplished in the following steps:

a. The industrial staff reviews the level and characteristics of work assigned in the past. An important part of this review is an examination of trends in demand placed on the facility by each of the District Engineering Support Managers.

b. A review of any previous communication with the District relative to tentatively planned work is conducted. In some Districts this communication takes the form of a formal work load forecast.

c. The industrial manager assumes either a stable labor force or has been able to project how his labor force will change over the course of the year.

d. Based on steps a, b and c above, the Industrial Division's staff is able to develop a twelve month estimate for direct labor cost, materials and supplies.

e. Expected overhead charges are computed. The most preponderant of these costs are those that are personnel related such as leave and fringe benefits, but such items as a share of the cost of operating the Support Center as a whole, utility charges, supervision, substandard work that must be redone, training, shop supplies, equipment and idle time are also included.

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[3]Over the short range, the industrial labor force is constant in number and cannot be easily adjusted to accomodate reduced volume. As will be disclosed later, the District is bound to absorb any idle labor costs and therefore finds it cheaper to keep the labor force busy even if that entails assigning work that could be done more economically by contract.

The principle output of the Industrial Division's budget process is the Industrial Budget-Operating Plan (CG4135) (included as Exhibit 3-1). This document plus the tentative District program mentioned earlier forms the basis for negotiations between the District Engineering Support Managers and the Support Center Industrial Manager in finalizing the industrial budget. The negotiation results in the establishment of OPTARS from each engineering support Operating Guide which together constitute the level of funding the District is committed to for the upcoming fiscal year and against which work orders will be written.

From the point of view of the District Engineering Support Manager, the budget is only a planning guide. From the point of view of the Industrial Manager, however, it is much more important because it establishes the all important overhead rate and it approves funding for the Industrial Division's internal needs. As an example, if the Industrial Manager feels the need for a major, non-capital piece of equipment, he includes its expected cost in his overhead computations. If approved, the budget provides authorization to satisfy that internal need and the desired equipment may be procurred by charging its cost to the overhead account. This serves the purposes of making the Industrial Division much more of a self-supporting entity and ensures that all of its (non-capital expenditure) costs are covered by its "product."

2. Cost Accounting Mechanisms

Although Account 19 is the most frequent cost accounting mechanism both operators and engineers encounter, it is by no means well understood. Perhaps by walking through the life of a work order using the traditional journal entry and T-account tools, some of the confusing aura that now surrounds the Account 19 system can be dispelled.

TREASURY DEPARTMENT U. S. COAST GUARD CG-4135 (3-62)	INDUSTRIAL BUDGET - OPERATING PLAN - PART I					
BASE			DATE		FISCAL YEAR	

INDUSTRIAL COSTS	PROJECTED CURRENT FY	BUDGET FY	BUDGET DISTRIBUTION BY QUARTERS			
			1ST QUARTER	2ND QUARTER	3RD QUARTER	4TH QUARTER
DIRECT COSTS:	(1)	(2)	(3)	(4)	(5)	(6)
Military Labor						
Wage Board Labor						
TOTAL DIRECT LABOR						
Supplies and Materials						
Travel						
Other						
TOTAL DIRECT COSTS						
OVERHEAD COSTS:						
INDUSTRIAL PLANT MAINTENANCE						
Military Labor						
Wage Board Labor						
Supplies and Materials						
Contractual Services						
SUBTOTAL						
OTHER OVERHEAD COSTS:						
Military Leave & Holidays						
Military Idle & Non-Productive						
Military Supervision						
Wage Board Leave & Holidays						
Wage Board Idle & Non-Productive						
Wage Board Supervision						
Salaried Personnel						
SUBTOTAL						
CG Retirement Contribution						
Housekeeping & Shop Supplies						
Travel						
Fuel, Power & Utilities						
Other						
TOTAL OVERHEAD COSTS						
TOTAL INDUSTRIAL COSTS						
OVERHEAD RATE APPLIED (TOT OVHD COST / TOT DR LB COSTS)						
OVERHEAD COSTS APPLIED						
CUMULATIVE UNDER (Over) APPLIED OVERHEAD COSTS						

Exhibit 3-1

Assume that an Engineering Support Manager (in our case the District Chief of Civil Engineering Branch) has agreed to establish an OPTAR of $25,000 to support industrial operations for this quarter. The fournal entry for this first step would be:

a. Unobligated Balance (OPTAR 4300EC) $25,000
Civil Engineering Operating Guide-43 $25,000

An administrative reservation of $25,000 from the Engineering Support Manager's Guide has been created against which work orders may be written.

In the next step we shall assume the Engineering Support Manager has actually written a work order and that he expects Industrial Division's labor, material and overhead costs for the planned work will be about $1,200. Industrial Division will review the work order for acceptance and a contract to perform the stated work at the allotted amount will then exist between it and the District Civil Engineering Support Manager. The agreement will be formalized in the accounting system by the entry:

b. Undelivered Orders (WO G110) $1,200
Unobligated Balance (OPTAR 4300EC) $1,200

With this entry, an obligation or legally binding reservation now exists in the amount of $1,200 for work order G110 and our original $25,000 OPTAR has been reduced by the same amount.

In the third step, the Industrial Division begins to accrue charges to the work order. These charges are recorded on a daily basis using two basic mechanisms:

(1) A computer readable time card which has been annotated with each employee's name, his actual wage rate, a listing of the work orders he expended effort on that day and the number of hours he spent on each project.

(2) A daily obligation journal voucher that is prepared by the Industrial Division's Accountant listing the day's material and applied overhead charges per work order.

These two documents are forwarded by mail to the District's computer center where, in conjunction with their processing, two journal entries are made; one to a work order work in process account and a second to a set of two Master Work in Process Accounts. If accruals of direct charges of $500 (labor and materials) are recorded and based on the year's budgeted overhead rate indirect costs for today's work is $600, the journal entry would be:

c1. Work In Process (W/O G110) $1,100
Undelivered Orders (W/O G110) $1,100

This entry has the effect of recording the day's costs for work order G110 and liquidating a portion of the obligation established when the work order was originally issued.

It is recognized that out of $1,200 set aside for this work order, charges of $1,100 have been recorded, a portion of which goes for direct labor and materials and the remainder of which is set aside to cover the actual overhead charges the unit will accrue in the performance of this project. The second entry reiterates this step more explicitly by journalizing:

c2. Account 19.01 $500 Debit entry only at this point
Account 19.02 $600

which records a $500 charge to the Industrial Division's Master Work in Process Account for direct costs and a $600 charge to the Industrial Division's Master Work in Process Account for Overhead.

The fourth step in the work order's accounting life is to complete it. Assuming that we were able to complete the work at a cost of $50, the computer records

d1. Work in process (W/O G110) $50
Undelivered Orders (W/O G110) $50

d2. Unobligated Balance (4300EC) $50
Undelivered Orders (W/O G110) $50

and

d3.	Account 19.01	$20	Debit entry only
	Account 19.02	$30	

As in step c, we have charged both work order G110 and the Master Work in Process accounts with the day's direct costs of $20 and applied an allowance for overhead of $30 (steps d1 and d3) bringing the total work order charges to $1,150. At the same time (as was done in step c) we have liquidated a second portion of the original $1,200 set aside to complete the work order through the $50 charge to undelivered orders (step d1). The difference in our action from that of step c however, is noted by step d2's entry to "unobligated balance (4300EC)" for $50 and "undelivered orders" $50. These entries have the effect of returning the unused $50 to the OPTAR available for additional Industrial Division work and clearing the work order from the Industrial Division list of pending "contracts."

While work is complete and the Industrial Division has discharged its obligations to the Civil Engineering Support Manager, the accounting requirements are incomplete. A quick look at Exhibit 3-2 will disclose that as of step c both the work order and Master Work in Process accounts (19.01 and 19.02) are still open. Further, the accounting purist has, up to this point, undoubtedly been troubled by the fact that we have been executing debit journal entries with respect to Accounts 19.01 and 19.02 with no corresponding credit entries. These irregularities will now be corrected.

One of the features the designers of Account 19 felt would be of value was a method of designating the beneficiary of Industrial Division services. Accordingly, at the point of completion of work, the Work Order in Process account is closed to the benefiting unit as follows:

e.	Station Chincoteague	$1,150	
	Work in Process (W/OG110)		$1,150

Exhibit 3-2

Civil Engineering
Obligation Guide 43

	(a) $25,000

Unobligated Bal.
Civil Engineering
OPTAR (4300EC)

(a)	$25,000	(b)	$1200
(d2)	$50		
E/bal.	$23,850		

Undelivered Orders
WO G110

(b)	$1200	(c1)	$1100
		(d1)	$50
		(d2)	$50

Work In Process G110

(c1)	$1100	(e)	$1150
(d1)	$50		

Master Work In Process
19.01 Direct Costs

(c2)	$500	(f)	$520
(d3)	$20		

Master Work In Process
19.02 Overhead

(c2)	$600	(f)	$650
(d3)	$30		
		E/bal.	$20

Station Chincoteague

(e)	$1150

Although the entry above does not bill the unit which has received Industrial Division effort it does associate the costs of services performed with the beneficiary similar to the way Repair Division costs were associated with individual aircraft in the AR&SC Cost Accounting System.

Finally, at the end of each calendar month, the Master Work in Process Accounts 19.01 and 19.02 are cleared by balancing the actual payrolls, materials billings and overhead costs against the charges previously collected in the accounts. The reader will remember that Account 19.01 collected direct charges which had been computed based on actual wage rates, actual labor time and actual material charges. Unless a bookkeeping error has been made somewhere, then, the payroll totals and material billings should exactly match existing direct work in process charges and Account 19.01 will have a zero balance at month's end. With respect to overhead, the reader will remember that our work in process charges to Account 19.02 were entered on an estimated (applied) basis. As such these charges approximated the overhead costs the facility was actually generating but in all likelihood did not match them exactly. Suppose, in our case, the actual overhead recorded at the end of the month was $650. The journal entries to Accounts 19.01 and 19.02 at this point would be

f.	Credit entries only	19.01	520
		19.02	650

Reference to Exhibit 3-2 shows at this point that 19.01 has a zero balance. Account 19.02 on the other hand shows that $20 more actual overhead has been generated in completion of this work order than was originally charged to the work in process accounts. In other words, we have under applied overhead. It is quite possible for the opposite case to have occurred. For example, if our actual overhead costs had been $600 we would have charged the work in process accounts $30 too much (i.e., over applied overhead). In any case, Support

Center Portsmouth's policy is to retain that residual in Account 19.02 until the end of the fiscal year. Since the Industrial Division may neither make a profit or suffer a loss, the net residual under or over applied overhead must be charged back or refunded to the District Engineering Support Managers. Under current policy, these charges or refunds are made to the three support managers in proportion to the amount they funded the Industrial Division during the year. Typically, an effort is made to monitor the status of Account 19.02 throughout the fiscal year and to make any operating adjustments felt necessary to maintain as small a residual overhead balance as possible. As a result, in most years the end of year under/over applied overhead is neither large not a surprise to anyone and is easily accommodated.

3. Management Reports

As was the case at AR&SC, of paramount interest to the individual manager is not the accounting mechanics used, but the management reports that flow from the Cost Accounting System. Account 19, as implemented at Support Center Portsmouth, produces nine such reports, the majority of which are manually produced based on raw output from a computer analysis of the daily labor time card and material/overhead journal voucher submission. A listing and brief description of each of the relevant management reports is provided as follows:

a. Trial Balance Report: The daily Trial Balance Report (Exhibit 3-3) is one of the few totally computerized management reports available to the Industrial Division. It is principally an internal document which has as its features a listing of the original dollar amount set aside and the accrued expenditures recorded to date for each active work order. The unit's accountant is the primary user of this report, scanning it each day for those work orders who's accrued expenditures have exceeded 80 per cent of their budgeted allotment.

19112805R3
08/20/79

IAS Allotment Account Trial Balance

081779

To	Date	Doc	App Cd.	FY	Alot Unit	Work Ord	Sub Acc FLD	Available Allotment	Accrued Expenditures	Undelivered Orders	Unobligated Allotment Balance
		Total of Work Orders					A				

Exhibit J-3

Work orders so identified are brought to the attention of the shop supervisor having completion responsibility and a review is conducted to determine if additional man days, material or funds will be required to complete the work. Based upon this determination, the industrial manager knows either that he is on track with respect to any given project or that he must request additional obligation authority from the affected District Engineering Support Manager.

b. Base Management Report: The Base Management Report (Exhibit 3-4) is a biweekly computer prepared presentation based on manually collected input developed jointly by the Industrial Division accountant and Planner-Estimator. It is aggregated by work order and provides such information as the description of work to be performed, the estimated man hours and costs, actual costs as accrued and the physical percentage of work order completion. Although reviewed internally, the report's primary purpose is to provide an external report of work status for the benefit of sponsoring District Support Managers.

c. Monthly Report of Aged Work Orders: Closely related to the Base Management Report, this is an internally oriented manually prepared exception listing of those work orders which have been inactive for at least ninety days. This report (Exhibit 3-5) provides for the manager, the work order number, shop principally involved, a description of work that was to have been performed, unobligated funding balances and an indication as to the exact date the listed projects were last worked on. Its primary purpose is to indicate to management those jobs which may have developed problems that require management's attention.

d. Comparison of Actual Costs with Industrial Budget: The comparison of Actual Costs with Industrial Budget is one of a series of three quarterly reports which finds its way to management at both District and Headquarters levels. Presented in a format consistent with the original budget submission, the report (Exhibit 3-6) lists budget vs actual costs and the variance from the

Exhibit 3-4

BM000505
Job

		Time				Base Management Labor			Material			Funds			
No	Customer/Descrip.	Pri	Start	End	%Comp	Est	Act	Pct	Est	Act	Pct	Over/hd	W/O	C/T/D	%/Exp
B281	Oak Island 44366	1	09/14			84	1	.01	100		.00	10	1711	17	..1 Avbl

Exhibit 3-5

AGED WORK ORDERS

W.O.	Shop	Description	Balance Remaining	Last Date Worked
B070-7	X67	Taney Cable Harness	633.20	January '79
B155-72	X26	Madrona Bracket	92.87	November '77
B166-72	X67	Cherokee-All Equipment	1,167.72	May '79
B171-72	X67	Radiobeacon Calibrations	1,584.26	August '78
B179-72	X67	Ingham PC Boards	118.25	November '78
B182-78	X67	Ingham PP3916	178.01	August '78
B184-72	X67	Cape Henry URC-77	841.74 4,616.00	September '72
E136-79	X62	Mat Branch Supcntr Tractor	23.26	March '79
E155-79	X31	Coinjock Aero-Quip Hoses	257.22	March '79
E160-79	X68	Dist DPA Chart Panels	900.00 1,180.00	Mat. ordered Aug'76
F206-78	X26	Reliance Foundations	115.54	November '78
F220-72	X67	Cape Henry Equipment	1 1.21 216.75	June '78
G056-76	X51	Buxton Housing Sewage System	762.95	January '78
G066-77	X68	Cape Lookout Hand Rail	1,856.54	March '78
G072-72	X26X31X71	Parramore Boat Cradles	818.20	February '79
G074-78	X26	Supcntr Compressor Air Filter	3,441.22 6,878.91	January '79
H031-77	X31	Sledge Handling Gear	4,049.82	April '79
H064-77	X31	Taney Governor	4,721.45	May '77
H070-72	X31	30'UT(P)Rudders	587.48	April'78
H136-76	X31	Machine Gun Mounts	5,329.44	February '79
J072-72	X26	8X26 Buoy	2,358.84	March '78
J073-72	X26	9X38 "	3,229.54	September '78
J086-72	X26	Buoy Pocket Counterweights	2,012.96 7,601.34	November '78
K118-72	X26	Steel Ladders	2,321.71	November '78
K127-76	X26	Lantern Stands	510.97	October '78
K129-78	X26	Steel Ladders	2,646.85	April '79
K130-76	X67	Oregon Inlet Console	737.17 6,216.70	May '79

U.S. COAST GUARD	COMPARISON OF ACTUAL COSTS WITH INDUSTRIAL BUDGET	CONTROL SYMBOL
UNIT: USCG Support Center, Portsmouth, VA	QUARTER ENDED: 30 JUNE 1979	FB-6110

Budget	Actual	Variance from Budget		Budget	Actual	Variance from Budget
	THIS QUARTER		DIRECT COSTS:		CUMULATIVE	
			Military labor			
			Wage Board labor			
			TOTAL DIRECT LABOR			
			Supplies and Materials			
			Travel			
			Other			
			TOTAL DIRECT COSTS			
			OVERHEAD COSTS:			
			INDUSTRIAL PLANT MAITNENANCE:			
			Military labor			
			Wage Board labor			
			Supplies and Materials			
			Contractual Services			
			SUBTOTAL			
			OTHER OVERHEAD COSTS:			
			Military leave and holidays			
			Military idle and non-productive			
			Military supervision			
			Wage Board leave & holiday			
			Wage Board idle & non-productive			
			Wage Board supervision			
			Salaried Personnel			
			SUBTOTAL			
			CG Retirement contribution			
			Housekeeping & Shop supplies			
			Travel			
			Fuel, Power & Utilities			
			Other			
			TOTAL OVERHEAD COSTS			
			TOTAL INDUSTRIAL COSTS			
			UNDER/OVER ABSORBED OVERHEAD			
			TOTAL CHARGES TO WORK ORDERS			

Actual	O/H Rate	DISTRIBUTION OF OVERHEAD	Actual	O/H Rate
		Overhead costs		
		Overhead Charged to Work Orders		
		Variation		

Exhibit 3-6

budget, both for the current quarter and cumulatively to the report date. Also included is analysis of actual overhead costs with a comparison as to the budgeted rate.

e. Analysis of Direct-Indirect Ratio: Probably one of the most interesting indicators of Industrial Division progress against the budget is the manually prepared monthly analysis of direct and indirect labor costs. As was the case at AR&SC, several years of experience with this ratio has shown it to be consistent with the point at which the facility achieves its zero profit, zero loss goal. Further observation of this ratio has indicated that the direct/indirect trend established by the tenth of any given month is a good indicator as to whether the unit will reach its break even objective for that month. No one seems to know exactly why a 60% direct to 40% indirect breakdown is consistent with break even but over many years the indicator has been reliable giving the manager another indicator of the quality of his staff's performance and a monitor on the all important trend in actual overhead costs incurred. As shown in Exhibit 3-7, the report lists not only the direct and indirect labor cost percentages for several key dates throughout the month but the actual direct and indirect labor charges and the fixed costs absorbed by the facility for those same time periods.

f. Analysis of Work Order Activity: The Analysis of Work Order Activity is another of the manually prepared monthly internal reports developed by the Industrial Division's accountant. The report essentially provides the industrial manager with insight as to the character of the work orders currently pending by focusing on 14 specific indicators such as pending work in process, [illegible] this month, work completed, the pending backlog's dollar value and [illegible] analyses, a breakdown according to funding source (obligation [illegible] report (Exhibit 3-8) is of use to the industrial manager in that

Analysis of Direct-Indirect Ratio August 1979

Date			Percent D	Percent I	Direct Labor	Indirect Labor	Absorbed Fixed Costs
1	Officers	3,417.00					
2	Classified	3,583.00	59	41	3,495.90	(2,432.86)	1,063.04
3	CSR	6,750.00					
6	S&M	6,750.00					
7	P&V	5,500.00	55	45	4,949.25	(4,060.03)	1,952.26
8	Travel	83.00					
		26,083.00					
9			55	45	5,148.69	(4,169.78)	2,931.17
10			52	48	1,595.53	(1,479.37)	3,047.33
13			55	45	1,690.60	(1,372.02)	3,360.91
14			60	40	1,841.08	(1,234.80)	3,967.19
15			60	40	1,847.13	(1,235.22)	4,578.90
16							
17			55	45	3,363.05	(2,762.65)	5,179.30
20							
21			56	44	3,443.62	(2,696.03)	5,926.69
22							
23							
24							
27							
28							
29							
30							
31							

Exhibit 3-7

Analysis of Work Order Activity July '79

Description	30TE	30TN	42EE	43EC	45EN
#WOs on hand 1 July '79	43	32	20	26	52
#WOs received in July	4	3	1	3	4
#WOs closed in July	-0-	-0-	-0-	-0-	-0-
$Value WOs closed in July	-0-	-0-	-0-	-0-	-0-
$Returned to District	-0-	-0-	-0-	-0-	-0-
%$Returned to District	-0-	-0-	-0-	-0-	-0-
#WOs on hand end of July	47	39	21	29	56
#WOs complete but not closed	18	22	8	12	35
#WOs in process end of July	29	17	13	17	21
#WOs over three months old	19	7	9	11	11
$WOs over three months old	6,603.00	3,872.00	5,819.00	24,792.00	54,991.00
%WOs over three months old	59.8	7.8	41.7	62.6	52.3
$Backlog-Specific Work Orders	11,034.00	49,820.00	13,957.00	39,628.00	105,154.00
Variation from previous month	(3,275.00)	26,381.00	(469.00)	(1,305.00)	14,767.00

	46EC	80FA	OTHER	TOTAL
#WOs on hand 1 July 79	22	22	56	273
#WOs received in July	3	1	5	28
#WOs closed in July	-0-	-0-	-0-	-0-
$Value WOs closed in July	-0-	-0-	-0-	-0-
$Returned to District	-0-	-0-	-0-	-0-
%$Returned to District	-0-	-0-	-0-	-0-
#WOs on hand end of July	25	23	61	301
#WOs complete but not closed	8	8	48	159
#WOs in process end of July	17	15	13	142
#WOs over three months old	11	11	9	88
$WOs over three months old	19,561.00	18,140.00	14,238.00	148,016.00
%WOs over three months old	72.5	39.7	79.4	427
$Backlog-Specific Work Orders	26,992.00	45,653.00	17,931.00	310,169.00
Variation from previous month	(2,802.00)	7,880.00	(2,632.00)	38,545.00

Exhibit 3-8

it provides a monthly indication of the rapidity of work turnover and when looked at over a period of several months provides background data useful for making budget projections.

g. Analysis of Industrial Work Orders: Another of the reports that provide data by supporting Obligation Guide (Exhibit 3-9), this report is the second in the series of documents prepared primarily for District and Headquarters consumption. It discloses direct and indirect costs (with direct costs broken down into military labor, civilian labor, supplies, materials and travel), overhead, categorizes costs according to whether incurred on specific or continuous work orders and provides an analysis of work order dollar value by project age.

h. Analysis of Obligation Guide Funding: Using much of the same data as the Analysis of Industrial Work Orders, but aggregating it in less detail, the quarterly prepared Analysis of OG Funding accumulates actual funding levels by supporting obligation guide and on a percentage basis by engineering support manager. Displayed in Exhibit 3-10, this report is used internally, principally as a budget projection/justification tool.

i. Analysis of Work Order Costs by Class of Unit: Last in the series of three principally external reports, the Analysis of Work Order Costs by Class of Unit provides a listing of all quarterly and cumulatively incurred industrial costs aggregated by supporting obligation guide and also by one of ten categories of unit (Aviation, SAR Station, ships, etc.).[4] Theoretically this report enables the District or Headquarters manager to see what kind of

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[4]Two additional categories are included to accumulate costs of non-Coast Guard reimbursables, and those of manufacturing activity undertaken to fill stock inventories.

ANALYSIS OF INDUSTRIAL WORK ORDERS

UNIT: USCG Support Center, Portsmouth, VA — QUARTER ENDED: 30 June 1979

	30	42	43	45	46	OTHER	TOTAL
A. Cost Applied to WO's by OG. (Cumulative to date)							
1. DIRECT COSTS:							
Military labor							
Civilian labor							
SUBTOTAL							
Supplies & Materials							
Travel							
Other							
TOTAL DIRECT COSTS							
2. OVERHEAD							
TOTAL WORK ORDER CHG'S							
B. Cost Applied to WO's by Type (Cumulative)							
1. Specific							
2. Continuous							
3. Total							
C. Uncompleted Specific WO's (Unexpended Balance by age groups)							
1. 0 to 2 months							
2. 2 to 3 months							
3. Over 3 months							
4. Total							

Exhibit 3-9

Exhibit 3-1c

ACTUAL OG FUNDING FISCAL YEAR '79 THRU 3rd Qtr FY '79

	3ØSQ	3ØTE	42EE	TOTAL (eee)	
Funding to 6/30/79	-0-	52,802.00	29,060.00	81,862.00	7%
FY '79 Budget	-0-	52,500.00	45,000.00	97,500.00	
		302.00	(15,940.00)	(15,638.00)	

	3ØSQ	3ØSC	43EC	TOTAL(ecv)	
Funding to 6/30/79	21,391.00	-0-	137,362.00	158,753.00	11%
FY '79 Budget	35,500.00	-0-	75,000.00	110,500.00	
	(14,109.00	-0-	62,362.00	48,253.00	

	3ØSQ	3ØTN	45EN	TOTAL(ene)	
Funding to 6/30/79	-0-	*274,717.00	273,512.00	548,229.00	42%
FY '79 Budget	35,500.00	315,400.00	90,000.00	440,900.00	
	(35,500.00	(40,683.00)	183,512.00	107,329.00	

	3ØAQ	46EN	46EC	TOTAL(A/N)	
Funding to 6/30/79	233,198.00	-0-	162,359.00	395,557.00	30%
FY '79	225,000.00	-0-	120,000.00	345,000.00	
	8,198.00	-0-	42,359.00	50,557.00	

	3ØFA	8ØFA	Other	TOTAL	
Funding to 6/30/79	38,796.00	93,530.00	2,967.00	135,293.00	10%
FY '79 Budget	18,000.00	135,000.00	55,500.00	208,500.00	
	20,796.00	(41,470.00)	(52,533.00)	(73,207.00)	

Grand Total
1,319,694.00
1,202,400.00
117,294.00

*Does not include WO D316 for 105,400.00 which will be reversed in 4th quarter and distributed as indiviual work orders.

UNIT: USCG Support Center, Portsmouth, VA — Quarter ended: 30 June 1979

CLASS OF UNIT	COSTS THIS QUARTER BY OG 30	42	43	45	46	OTHER	TOTAL	CUMULATIVE TO DATE
1. Floating Units								
2. Aviation Operations								
3. Coast Guard Stations								
4. Light Stations								
5. Group Offices								
6. Bases & Depots								
7. Supply Depots								
8. Other Shore Units								
9. Unmanned Aids-Afloat								
10. Unmanned Aids-Ashore								
11. Reimbursable work								
12. Mfg for Inventory								
TOTAL CHARGES TO WORK ORDERS								
CUMULATIVE TO DATE								

Exhibit 3-11

activities are benefiting most from industrial activity, which engineering support managers are making the greatest inputs to engineering support via the industrial program and what types of activities they are supporting.

C. MANAGEMENT INFORMATION NEEDS VS THE ACCOUNTING SYSTEM

Once again, although we are clearly the beneficiaries of an accounting system that provides an enormous amount of management information, the question of relevance to the information needs of management arises. The following section attempts to list those information needs articulated by management at the levels of the Industrial Manager, the District Chief of Engineering, the Support Center Commanding Officer, the District Engineering Support Manager, and as was done in the preceding chapter, to compare those needs to the information the Account 19 system has provided.

1. Information Needs of the Industrial Manager

The information needs indicated by the Industrial Manager can be grouped into four general categories; work order management information, industrial workforce evaluation information, long and short range planning information, cost estimation and financing information, information to facilitate internal control and ensure accounting accuracy and information to make resource acquisition/capital investment decisions.

a. Work Order Management Information

(1) Detailed Data on Current vs Budgeted Work Order Costs. This is the central and probably most complex need for information at the Industrial Division level. The problem has three identifiable phases:

First, simply having a total budgeted vs actual figure for each work order for any given point in time is not considered sufficient. Instead, because status of each of the work order's cost components (direct labor, supplies, materials, indirect labor, travel, etc.) potentially conveys a different

message to the manager, current information on each one of these line item areas must be provided. Furthermore, on lengthy multicraft jobs where several shops are involved and distinct job phases can be identified, the same line item information must be provided by shop and/or by job phase. Having detailed benchmarks against which a work order's progress can be measured allows the Industrial Manager to identify his problem areas and to take corrective action immediately.

Secondly, the budgeted vs actual measure must indicate well in advance where funding deficiencies are likely to occur. Because the primary orientation of the industrial facility is Coast Guard peculiar or emergency work and getting specific jobs done is more important in most cases than cost, most Industrial Managers find that District Engineering Support Managers do not object strenuously to a requirement for supplemental funding. Their need, however, is to be appraised of additional funding requirements far enough in advance so that they have the flexibility to modify the scope of the project to bring it within the allotment of available funds or to reconcile any required funding changes with other quarterly expenditure plans.

Finally, because of the large number of work orders in process at any given time, the Industrial Manager must be made aware of potential problem areas or an exception basis.

The Aged Work Report, the Trial Balance Report and the Base Management Report provide part of the information the Industrial Manager requires in this regard. In fact, these reports seem to be more than adequate for the average short term work order. The deficiency is that they are all total work order cost oriented and do not provide the type of early warning by job phase or shop the Industrial Manager seems to require for the longer, more involved projects.

(2) Daily Cost and Progress Reports. In a production environment when problems may surface on a daily or sometimes even on an hourly basis, there is a need, at least at the local level, for daily cost and progress reports for particularly critical work. Although many feel that the first line supervisor is a better source of real time information than even daily cost accounting reports could be, the supervisor occasionally is part of the problem. As such, the Industrial Manager needs an independent reporting mechanism to make himself aware of problems which were either not reported or not recognized by supervisory personnel. Currently only the Trial Balance Report is designed for daily reporting but it is probably not aggregated in as much detail (as we saw above) that a status report needs to be nor, despite its name, is it received in a timely enough fashion. While inputs to the District Computer facility which prepares the report are made daily, mail transmission, key punching and processing time result in the Industrial Division receiving daily reports of activity which took place three to five days ago.

(3) Information to Determine What Steps Will be Required to Get a Project Back on Schedule. Having identified problem areas, the Industrial Manager's responsibility is to determine the optimum reallocation of resources to get the project back on schedule while causing the least amount of disruption to other active work orders. Although some of the cost information Account 19 generates could be of value in making such a decision, none of the existing reports specifically addresses these questions. Rather than try to modify the accounting system to provide decision information in this regard, a specific case application of one of the existing Operations Research techniques would probably be more appropriate.

(4) Why Will There be Extra Costs? Determining why actual costs will exceed budget for any given work order is necessary for two reasons. The customer (Engineering Support Manager) will demand the information and looking at the whys may identify problem areas that can be overcome with the Industrial Manager's individual attention.

The Trial Balance Report on a reasonably expeditious basis and the Base Management Report identify that extra costs will be incurred but do not identify why. Variance Analysis techniques common to some types of cost accounting systems do tend to indicate the whys behind variations from budgeted costs but because Support Center Portsmouth's varied work characteristics prevent the adoption of time or costs standards for many of the projects they are assigned, these techniques cannot be used.

(5) Which Work Orders Have Not Been Worked on in a Long Time? One of the tools the Industrial Division has found of benefit in identifying problems, not only in production but in such related areas as supply, capacity and manpower skill availability is to periodically review those work orders that charges have not been levied against in ninety days. The Aged Work Order Report as prepared monthly by the unit's accountant is designed specifically to fulfill that requirement.

(6) What Will the Cost Impact Be If the Job Has Not Been Staged Properly? Among the most frustrating and preventable causes of inefficiency in the industrial environment is failure of shop supervisors to order critical materials on time. This failure results in the need for special orders, special trips to suppliers and always results in increased actual overhead. What seems to be necessary is a system feature that identifies that critical materials are part of an individual work order, and reports that they have or have not been ordered.

None of the existing Account 19 mechanisms or reports addresses this question although a system modification that enabled the Industrial Manager to track key job phases could set up a critical materials order as a job phase. The cost and time impact of a failure to expeditiously order critical materials has also been expressed as something the Industrial Manager needs to know but it is not a feature of the existing system of reports either. Instead, it must be estimated on a case by case basis manually.

b. Work Force Evaluation Information

(1) Information is Needed to Evaluate Supervisory Efficiency. Three methods of rating individual supervisors were identified in this writer's conversations with individuals who are now occupying or have in the past filled Industrial Manager billets. Specifically, a supervisor may be evaluated in terms of how often his shop meets established deadlines on single shop work orders, on multicraft work, he may be evaluated on how often his phase of a project is completed so as not to cause delays for other shops, and third, as a reflection of proper training, he may be evaluated according to the trend in his shop's labor rate. Progress against deadlines is given for single shop work by the monthly Base Management Report and data on current costs vs dollars available is provided daily for the same type of work in the Trial Balance Report. While the Monthly Aged Work Order Report certainly makes some implications about shop, hence supervisor performance, none of the present reports directly addresses the question of the supervisor's success in integrating his shop's work with others on multishop jobs and none of the reports provide a comprehensive work order analysis by shop.

(2) Trends in Materials/Labor Cost and Labor Hours by Trade. Although not felt necessary as a means of evaluating individual shops or workers, trends in costs and hours by trade was mentioned as being important

to enable the manager to identify causes beyond the control of workers which were causing increases in costs and hours. In one example given, a manager reported that he found his costs and labor time accelerating because District Engineering personnel were bypassing the Industrial Manager for small but unfunded and unofficial projects and in another case shop personnel were being used to provide design services. Other possible causes of cost accelerations might include inadequate equipment, substandard materials or poor project design.

Cost trends for specific line items (labor, supplies, travel, etc.) are available on a total division basis if the Industrial Manager desires to review past issues of either the Comparison of Actual Cost with Industrial Budget Report, the Analysis of Industrial Work Order Report or on total work order cost basis, the Daily Trial Balance Report. None of these reports, though, provide a view of line item trends by trade as seems to be desired in this regard.

(3) Measure of Work Force Efficiency. Any organization in which direct labor and labor related costs comprise as large a portion of the budget as is the case at Support Center Portsmouth (about 59%) must have a method of measuring work force efficiency. While traditional labor efficiency variance analysis is not possible because of the absence of man hour performance standards in many areas, an examination of the labor/labor related cost portions of the Comparison of Actual Costs with Industrial Budget Report seems to provide a good indication of current labor efficiency as does the Analysis of Direct-Indirect Ratio.

(4) Is the Customer Satisfied? While this type of feedback does come from the comments of the District Engineering staff and from such indicators as the amount of rework, it is not a product of the Account 19 system.

c. Long and Short Range Planning Information

(1) Information to Facilitate Budgeting and Work Scheduling. Two basic types of information are necessary under this category. First, the Industrial Manager needs to have an idea of the total dollar value of funding that will be made available. This factor helps him predict what his activity level will be and hence the necessary rate of overhead application which will be required to cover fixed costs. Second, the Industrial Manager must have information on the type of labor services that will be required (e.g., the number of expected hours for carpenters, electricians, etc.).

While the accounting system's Analysis of Industrial Work Orders, Analysis of Work Order Costs by Class of Unit, Analysis of Work Order Activity and Actual OG Funding Report provide ample historical data on past levels of funding both in total and by Engineering Support Manager, none of the existing reports seem to provide precise predictive information by class of expected labor. This of course must be provided by other means such as a District provided work forecast or a separate analysis of past work orders by skills involved.

(2) Information on Long Range Facility Usage. A current problem is that with slightly more labor or equipment capacity, the unit could absorb a significantly higher work load with little increase in overhead. The result would be a lower overhead rate and significantly reduced costs to customers. Unfortunately, the necessary mix of labor skills and physical plant does not now exist to perform much work the unit could encounter a demand for, and with long procurement lead times and involved civilian personnel regulations the unit cannot respond quickly to changing or increased needs for its services. As a result, much work must now be performed inefficiently with inadequate equipment, and labor working outside its' primary skill area. To mitigate these

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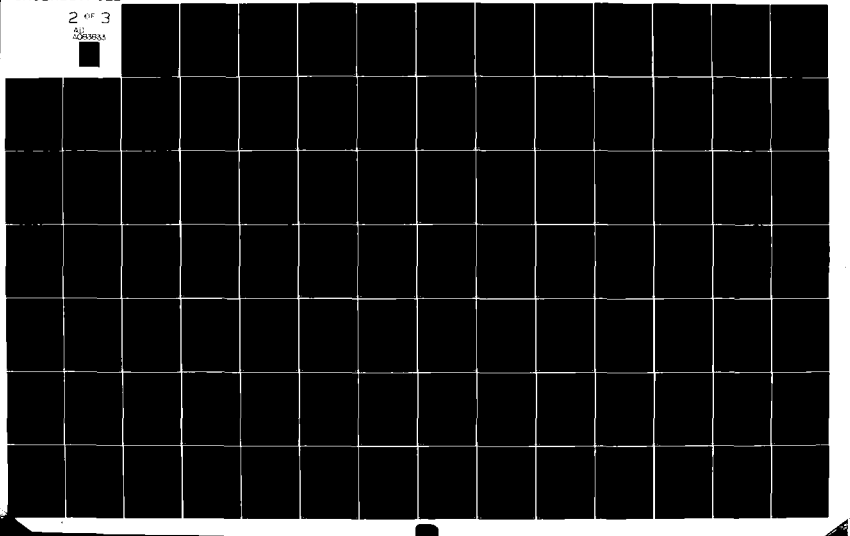

types of problems, the Industrial Manager must be appraised well in advance of changes in labor skill requirements, job characteristics and work load.

Although it is obvious that this type of information is not forthcoming from the accounting system, the Industrial Manager could help decision makers perform the strategic planning function by being in a position to provide past cost data in such varied formats as by hardware type, by physical structure per man hour, by Obligation Guide, by geographical area of usage, by type of labor or by year. Many of these aggregations are presently reported via the Analysis of Industrial Work Orders and Analysis of Work Order Costs by Class of Unit. Flexibility to aggregate cost data in additional formats though, would probably prove helpful if the requisite data processing capability could be made available.

(3) Information to be Able to Systematically Prioritize Work. As are most resources available to the government, the Industrial Division's capabilities are limited. The question of which needs are to be met by the industrial resource is one that is common to all levels of industrial management including that of the Industrial Manager. In part, the pricing feature available through the industrial accounting system answers that question. To explain in a more theoretical vein, industrial costs proceed along a curve from infinitely expensive if minimum time and maximum resources are involved to competitive with outside contractors if a more leisurely pace is permitted. The pricing system, therefore, helps decide the issue of scheduling (i.e., can we pay the premium to have the work done immediately or can we wait a few weeks), separates the critical needs from the non-critical (non-critical demands would abound if the industrial services were cost free) and ensures that the most effective use of dollar resources is made by making the industrial facility non-competitive for those services it cannot perform efficiently.

(4) Information is Needed to Help the Industrial Manager Decide If He is Able to Accept Additional Work. While price constrains the potential customers' use of the industrial facility, the Industrial Division itself is constrained only by its own capacity. Although the Analysis of Work Order Activity Report provides ample data on the rapidity with which work is being completed and can be monitored from month to month to determine if the work backlog is increasing for the facility as a whole, this is still not sufficient detail to indicate when a potential overload is on the horizon. Too great a work load in any individual shop can prevent timely completion of either a single shop work order or a multicraft work order. Backlog data by shop therefore is significantly more relevant as to whether capacity has or is about to be exceeded than is backlog information for the entire facility. Currently no existing reporting mechanism provides that information.

(5) Information is Necessary to Determine Inventory Levels and Stock Turn. Since materials are required for almost all work orders, inventory data is critical for production scheduling and work completion. The Cost Accounting System, of course, is only pertinent as far as materials costs are allocated to work orders and this information is not of itself sufficient for inventory management purposes.

d. Cost Estimating/Financing Information

(1) Information on Actual Overhead Trends. Such information is helpful in three ways. First, since most overhead at the Support Center varies with the size of the workforce, declining actual overhead charges are indicative of reducing personnel capacity. Second, overhead finances much of the Industrial Division's internal purchases, and increases in actual overhead may require the Industrial Manager to modify his procurement plans. Third, as the reader will recall from the discussion on accounting, excess overhead over

the budgeted amount must be made up from the Engineering Support Manager's funds. The Industrial Manager is, of course, responsible for providing early warning of this necessity. The existing system does provide a look at the overhead trend as part of the Comparison of Actual Costs with Industrial Budget Report. The only deficiency this writer sees, however, is that quarterly submission of the report may not provide as timely a review as may be required, particularly near the end of the fiscal year.

(2) Work Order Cost Estimating Data. Because much of the work done by the Support Center is non-standard, emergency or remote, the normal cost estimating information sources do not provide a satisfactory base from which to estimate costs in some circumstances. As a result, the Industrial Division finds it necessary to maintain its own cost data base to evaluate the dollar limitations established for each work order by the Engineering Support Managers and to provide estimating data to engineers as they request it.

Although none of the present accounting reports provide the kind of detailed line item breakdown by work order that would be most useful to estimators, a file of completed work orders is kept that does provide this level of information. Although accessing this data requires a manual search, such did not seem to be a problem for those information users interviewed.

e. Information to Evaluate Accounting Accuracy and Internal Control

The Industrial Manager and his staff must be in a position to answer such questions as:

1. Are work order deficits being covered up by charging costs to work orders having surplus funds?

2. Is overhead erroneously being "double allocated" by charging what normally are indirect costs as direct?

3. Do charges appear normal for the type of work done?

4. Have all cost categories been charged correctly (e.g., not simply charging a cost as indirect but to the more specific categories like training and supervision)?

Accounting precision along these lines is necessary if the purposes of having the Account 19 system (ensuring that proper costs are associated with benefiting units, ensuring that the customer has paid the correct price and ensuring the availability of accurate historical data for future budget projections) are to be realized.

No accounting system is mistake proof and Support Center Portsmouth's Account 19 system is no exception. The availability of time card/journal voucher source documents and the daily Trial Balance Report, however, do help to make the system auditable. As such accuracy and internal control are facilitated.

f. Resource Allocation/Capital Investment Decision Information

(1) Information to Justify Additional Capacity/Capabilities. Although mission requirements are the principle determinant with respect to the level of capacity that will be needed, the ability to show that in house forces can provide services at costs competitive with private industry is an equally important factor. While completed work order records are one source of comparability data, these records must be accessed manually. What would seem to be necessary, is a feature which reported costs by major type of Industrial Division product (e.g., the modal overhaul cost of a diesel engine). Although the Analysis of Work Order Costs by Class of Unit approaches satisfaction of this requirement, the class of unit aggregations seem much too broad to provide the necessary specific comparisons.

(2) What Would the Impact of Acquisition of a Major Piece of Labor Saving Machinery Be on Over-All Industrial Costs? To a limited extent,

the Industrial Manager can substitute machinery for manpower. Once such a substitution is made, the flexibility to shift personnel resources from one type of task to another is lost. As such, the decision to substitute capital for labor is one that must be weighed very carefully. Although the costs of machinery are readily determinable, other types of information which would go into a capital acquisition decision would be the productivity of the labor alternative, actual labor costs (wages as well as fringe benefits) and an accurate projection as to the level of usage we might expect with respect to the machine. While projecting the level of machine usage is really external to the cost accounting system, labor productivity and actual labor costs are factors the Account 19 system routinely records and reports via the Comparison of Actual Costs with Industrial Budget and Analysis of Direct-Indirect Ratio. The system does not report these factors by shop or by trade as would be most beneficial in making a man/machine trade off decision.

2. Information Needs of the Commanding Officer

Whereas the Industrial Managers' interests were mainly on having enough information to control Industrial Division production on a day to day basis and on preparing the division for future requirements, the Commanding Officer's focus seems to be more on performing an oversight function, monitoring Industrial Manager performance, insuring that the right mix of resources is available to do the job and on ensuring that external reports properly reflect command effectiveness. The following list of specific information items provide the data the Commanding Officer seems to need in this regard.

a. The Final Cost Results of Every Industrial Work Order Effort

Specifically mentioned here were the final total cost of every work order, the actual labor material and overhead costs and an indication as to the variance from the original work order estimate. The bi-weekly Base

Management Report provides all necessary information with respect to these requirements.

b. Overall Industrial and Individual Work Order Costs Per Man Hour

Because of the nonstandard nature of much industrial work, it is frequently very difficult to compare Industrial Division productivity with that of the private sector. Cost per man hour is one index which is felt to transcend the individual job characteristics and most Industrial Managers try to keep abreast of their own unit's cost per man hour. This index is not specifically reported as part of any of the existing reports but is easily computable on an individual work order basis from data given in the Base Management Report. A random sample of individual work orders should allow for a reasonably accurate industrial cost per man hour for the division as a whole.

c. How Much Did Raw Materials Purchase Price Increase From the Time of Work Order Estimate to Job Completion?

Budgeted vs actual materials cost data is provided as part of the Base Management Report but price changes are only one factor in any difference between estimated and actual material charges. The accounting system, therefore, does not appear to address this information need.

d. Why Was Overtime Used, How Much of Its Use Was Unpredicted and Was It a Benefit or a Necessity?

Only as budgeted labor costs vary from actual as reported in the Quarterly Comparison of Actual Costs with Industrial Budget does the present reporting system imply that overtime was used. The specific questions about overtime posed by the Commanding Officer would have to be the subject of a special investigation with regard to that variance.

e. Do We Have the Required Skills Aboard to do Work Efficiently?

A Cost Accounting System can, in part, provide some indication that the mix of manpower skills is not optimum if performance standards and

variance analysis are among its features. As discussed earlier, such features are not a part of the Support Center's system and the question of proper skills mix must be determined by other means.

f. What is the Percentage of Rejects and Reworks Required?

Except as cost and time variances are indicated in the Base Management Report and as may be implied in Direc-Indirect Ratio trends, rejects and reworks are not regularly listed in any of the existing accounting system outputs.

g. Are the Customers Satisfied?

Covered under "Industrial Manager."

h. Is There Enough Information to Establish an Audit Trail?

Covered under "Industrial Manager."

i. What Are Lost Time Injuries Reflective Of?

While there are lost time injuries in any industrial environment, their incidence can be indicative of any number of problems, such as incompetence, an unsafe work situation, lack of training, or lack of sufficient workers for the task.

The Account 19 system does not answer why with respect to these questions nor does it appear that it was designed to do so.

j. What Will the Costs and Productivity Impact of Meeting Some Special New Requirement (e.g., OSHA Regs.) Be?

Again, the accounting system was not intended to provide this type of information directly. The ability to provide past cost data with respect to shops, standard tasks and recurring types of work could, however, be helpful in this area in that it would provide a detailed base against which the impacts of new requirements might be estimated. For example, if the time for a particular recurring task without the new requirement were known, we

would at least have a benchmark against which a new standard time could be projected given the additional constraints.

As has already been mentioned, completed work order files can provide a portion of the potentially useful information but the system of accounting reports seems weak in the area of past shop and standard task information.

k. When Something Goes Wrong, Who is at Fault?

In this regard the Commanding Officer would like to know if a problem resides with the Industrial Manager, an employee, a shop or is it the result of lack of support on the part of the District.

Currently, as the reader will remember, performance is reported only on the basis of the division as a whole with some implications by shop possible for single shop work orders. As such, the exact management level at fault is not identifiable from the existing accounting reports.

3. Engineering Support Manager Information Needs

As the principle customer of the Industrial Division, the Engineering Support Manager's need for information revolves around the questions of appropriate funding levels, status of existing funding and current status of projects. As was the case with managers at the Industrial Manager and CO levels, the Engineering Support Manager's concerns are expressed in a series of specific information needs which can be listed as follows.

a. Information to Decide If We Can Send Work to the Support Center or Contract it Out

Six criteria are used to make the in house vs contract decision. They are, perspective costs, Industrial Division capacity, job complexity, probable difficulty in preparing specifications and plans, contracting time and job location. Of particular interest is the way in which the peculiarities

of remote or offshore work (as reflected in past work order information) may effect these criteria.

Only the historical cost data collected by the Account 19 system is potentially pertinent to the decision criteria. Engineering Support Managers do find this information to be valuable, however, and they expressed no problems in gaining access to it when necessary.

b. Need for Periodic Work Order Status Reports and Final Work Order Prices

As mentioned earlier, over-runs on work orders are not unusual and normally tolerable if enough advance warning is available. On most work a report every thirty days is satisfactory but occasionally daily reports are required.

While the biweekly Base Management Report adequately services the Support Manager's needs for most cases, he must suffer the same dealys as does the Industrial Manager for daily reports.

c. Historical Trends in Past Funding

How much the Support Manager funded the Industrial Activity last year and what has been the funding trend are critical factors in the budget process discussed earlier in this chapter. Both the Analysis of Work Order Costs by Class of Unit and the Analysis of Industrial Work Orders are specifically set up to disclose past work order charges by (Support Manager's) Obligation Guide. A quick review of past quarters' submissions of these reports should enable the Support Manager to get an idea of the most recent funding trends.

d. Budget vs Actual Data on a Total Industrial Budget Basis

This information is clearly presented on a quarterly basis as part of the Comparison of Actual Cost with Industrial Budget Report.

e. Timely End of Year Information on Funds Status (By Obligation Guide)

Since virtually all Industrial activity funding is from annual operating expense appropriattions, it is imperative that the status of obligations against the reservations each Engineering Support Manager has set aside for industrial work be known precisely as the fiscal year draws to a close.

A cumulative total as of the third quarter is available for each Obligation Guide from the Analysis of Work Order Costs by Class of Unit and the Analysis of Industrial Work Order Reports. Beyond that, however, it would seem that the Engineering Support Manager would have to track his funds on a memorandum record basis based on the Base Management Report and via frequent contact with the Industrial Manager.

f. Why Is a Project Behind Schedule and/or Over Budget?

As always, the whys are unknowable in dealing with the Account 19 system but the Base Management Report does indicate that a job is in trouble facilitating the managers investigation.

g. Information to Evaluate the Efficiency and Effectiveness of the Industrial Function.

Called upon occasionally to appraise the management of the Industrial Division, Engineering Support Managers draw upon the criteria of the job being completed on time and in a quality fashion, trends in the annual overhead rate, the number of work orders completed and costs per man hour per shop. Of these criteria, only overhead rate trends are reported to the Engineering Support Manager as part of the Comparison of Actual Costs with Industrial Budget Report. The number of work orders completed is available on a monthly basis as part of the Analysis of Work Order Activity Report but it is not normally distributed to Support Managers.

h. Information to Justify Additional Capacity

Covered under "Industrial Manager."

i. Information to Tell How Much a Facility or Hardware Item Over Which the Engineering Support Manager has Cognizance is Costing Each Year

In this vein, the Engineering Support Manager is asking such questions as how much is maintenance for an individual SAR boat costing, what repairs were required and why? Does the nature of the repairs indicate that the boat is not adequate for its mission or operating area? With respect to physical structures, we are interested in the annual maintenance outlay required to keep a structure habitable, would it be cheaper to build a newer, less maintenance intensive building? Where is the bulk of our in house maintenance effort going; to shore stations, vessels, operational facilities, housing or Non-Appropriated Funds projects?

In part, the Account 19 system satisfies these information requirements as, in its final accounting transaction, it distributes the cost of work orders to benefiting units. In report form it discloses its beneficiaries via the Analysis of Work Order Costs by Class of Unit. As the reader may agree, however, these reporting features might be more useful if cost distributions were more specific and detailed. Instead of reporting costs to a category like "Floating Units" it might be helpful to also report by class of floating unit. Instead of distributing costs only to the individual station, it might be useful for decision purposes to distribute costs to individual buildings. Although the Account 19 system collects enough information to provide the wide variety of aggregations suggested, actually doing so is limited by clerical staff and/or by the capacity of the data processing system. Normally, these types of multiple aggregations require a "Data Base" management system, a

significant amount of computing power and remote input/output devices.[5] The Account 19 system currently does not have access to all of these data processing features.

4. District Chief of Engineering/District Industrial Manager Information Needs

Many of the information needs associated with the District Chief of Engineering/District Industrial Manager level of management have already been articulated as being needs of lower levels. Those that have not, deal with information needed for management on a more strategic plane. Specifically, they are:

a. Information to Judge Efficiency by Comparison Against Standards

While judging efficiency was a concern at all previous levels, the Chief of Engineering would look at the question in a significantly different light. Although standards cannot be promulgated for many of the jobs the Industrial Division does, some tasks (e.g., buoy maintenance) and some individual steps in completing a work order are felt to be routine enough to develop standards for. Standard tasks could be observed at a number of industrial facilities, comparisons made, and the most efficient tools and techniques adopted service wide where possible. Development of task performance standards, as discussed before, would be required before Support Center Porstmouth could participate in such a program.[6]

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[5]A Data Base Management system is a software device which divorces input/output programs from data storage allowing the operation upon data without regard to physical storage location. This allows users to organize data according to their own individual needs and, with proper hardware, to interogate data directly without being limited by other user's programmed output formats.

[6]Technique currently employed by District Industrial Manager, Seventh Coast Guard District, Miami, Florida, Mr. Lin Budreau.

b. Is There Sufficient Work Going to the Industrial Division to Keep Them Gainfully Occupied?

As discussed earlier in this chapter, the District must absorb any end of year funding deficit. As these deficits are almost always overhead, and overhead is largely volume related, it is imperative that the facility be kept busy. The existing system via its Analysis of Work Order Costs by Class Unit and Analysis of Industrial Work Orders seems to provide ample historical data against which future funding plans may be balanced.

c. Is an Individual Shop Under or Over Utilized?

Closely related to the question of backlog by shop which arose under the discussion of Industrial Manager information needs, information here would be utilized at the Chief of Engineering level to determine if man power should be shifted to a highly backlogged function from an underutilized function which, because of its low utilization level, might more properly be contracted out. Again, however, the absence of the current system's ability to generate backlog data by shop is a problem in making the desired analysis.

d. Information to Help Establish Industrial Division Work Priorities

Covered under "Industrial Manager."

e. Information to Properly Review the Budget

Covered under "Industrial Manager."

f. Information to Monitor Particularly Critical (e.g., "Political") Work Orders

Information required here would be, is the work order on schedule, if not how far behind is it and if behind, why? While the Base Management Report provides progress against schedule on a biweekly basis, the current system does not respond with daily reports on a truly day by day basis.

g. What Are the Overhead Trends and Why Are They Changing?

The need for overhead information differs here from other levels because of the more timely requirement for overhead data as opposed to that expressed elsewhere. While lower levels seemed satisfied with the current quarterly overhead report which is a feature of the Comparison of Actual Costs with Industrial Budget, monthly, and in some cases weekly overhead trend information was demanded by interviewees.

h. Information to Make a Valid Biannual Review as to Whether an Industrial Division Function is Retained or Not

Information to make such a review would include past work load data by shop and past cost data to determine competitiveness against the private sector. Work load data by shop, as has been stated repeatedly, is not available. Past cost data is available from completed work order records but, again, must be manually searched.

i. Information to Justify New Capacity/Capabilities

Covered under "Industrial Manager."

j. Are Charges to Work Orders Being Made Properly?

Covered under "Industrial Manager."

k. What Activities or Hardware Items are Benefiting the Most From Industrial Division Effort?

Covered under "Engineering Support Manager."

l. Is the Unit's Man/Machine Mix Correct?

Covered under "Industrial Manager."

D. CONCLUSIONS, RECOMMENDATIONS AND PROBLEM AREAS

1. Assessment

While the reader may perceive some inconsistency between the comments made earlier in this chapter relative to the financial analysis/data processing

innovations of the present industrial staff and the failure of accounting reports in some cases to provide the required management information such an evaluation would be inaccruate.

In reality, the information needs of those levels of management involved with Support Center Portsmouth's Industrial Division are numerous and exceedingly complex and no information system could realistically be expected to satisfy all of them. The fact that twenty-eight of the forty-three distinct information requirements were in part met by the Portsmouth Account 19 system indicates at least a fair measure of success.

Several problem areas not previously discussed, however, do bear mentioning. They are:

a. The current interface with the District's data processing system involves a significant duplication of effort as journal vouchers are prepared and typed at the unit and are processed again via keypunch when they reach the District Computer Center. This second processing could undoubtedly be avoided if an input device were available in the Industrial Division office. Besides saving manpower, such a change would clearly be beneficial in solving the time delay problem noted with respect to receipt of the Daily Trial Balance Report and would undoubtedly reduce the incidence of transcription errors.

b. The District Data Processing Department frequently does not process overhead information at the same time it processes direct cost inputs. As a result, the transaction records for any given day stand a good chance of being in error.

c. While the Command seems to be interested that the cost accounting system's external reports convey a message to higher levels with respect to the unit's physical plant, manpower, equipment and financial needs and, expects that the external reports will play a part in higher command's evaluation of

the Support Center, none of the District respondents this writer interviewed saw external reports in that light. While reports were seen as playing a minor evaluative role, District Support Managers and the District Engineering Division level expected that communications regarding the unit's needs would come via special correspondence, the formal Coast Guard planning process or personal contact between the unit and the District.

d. Of the nine management reports discussed in this chapter, all but two are prepared manually by the Industrial Division's accountant. Few of the reports are documented anywhere and the majority of the analysis provided is highly dependent on the skill, experience and memory of one individual. The Industrial Division is aware of this problem and currently has plans to redesign most of these reports for machine preparation. In so doing they will be making the ability to generate the numerous detailed analyses a permanent feature of their Account 19 system and will be freeing the accountant for additional, in depth analytical work. Success in this venture will require the cooperation of District data processing staff.

2. Future Plans

While it is easier for an outside observer to dwell on problems, it is usually more beneficial to examine how the unit is attempting to correct problems which do exist and to study the improvements currently in process.

In Support Center Portsmouth's case, a program to modify the existing Account 19 system is planned which will include the following features:

a. Job Phase Breakdowns - Pert System

The existing work order numbering system which the current computer system reads in identifying and processing individual work orders will be modified to identify key job phases. For example, a multicraft work order might be tracked by assigning a basic series number (say, B234) and attaching

decimal modifiers to identify the work each craft or shop must do on the project. B234.25 might be assigned to the portion of the work the metal shop must do, B234.26 to the electrical shop and so forth. Ultimately the separate job phase numbers would be used to identify the legs of a Cost/Pert program which would track the project's progress and help management make decisions as to resource reallocations, overtime and scheduling.

b. Flags

Critical parameters would be established for particularly important work orders. For example, when percentage of accrued cost exceeded percentage of completion, an exception report would be printed to prompt investigation.

c. Backlog System

This modification would attack what is now one of the unit's most critical information problems by subdividing entering work orders into work packages identified by responsible shop. In all likelihood these would be the same work packages identified and tracked by the Pert system above. In this case the packages would be reported by shop allowing the Industrial Manager to tell at a glance which shops were at or near capacity or conversely, which shops were currently underutilized.

As discussed earlier, these types of modifications will require significant changes both in computer hardware and software. The most obvious needs would be for an in house terminal and for software that could be accessed by clerical personnel using plain language. Although expensive, the payoffs could be reduced clerical expense, much quicker progress feedback and more accuracy in accounting transactions and reporting.

IV. NON-INDUSTRIAL ENGINEERING SUPPORT ACTIVITIES

A. BACKGROUND

As mentioned in a footnote to an earlier chapter, the term "Non-Industrial" activity is really a misnomer in that it refers not to the type of services provided, but to the type of cost accounting system employed. The vast majority of the so called "Non-Industrial" activities in fact offer exactly the same type of multifunctional engineering support services performed by the larger Account 19 bases discussed in the preceding chapter. The only differences between them being a significantly reduced scope of operations with actual industrial costs in the two to five hundred thousand (vice one to three million) dollar range, a more limited clientele with the base principally supporting the Group Command of which it is a part and in some cases the offering of services of a more specialized nature (e.g., specialization in boat overhauls or engine repairs).[1]

The similarities between Account 19 and Non-Industrial activities are such that prior to 1976, many Non-Industrial bases were Account 19 funded. A June 1972 Department of Transportation internal audit report which questioned the cost of maintaining Account 19 at facilities with such small dollar volumes of activity, however, caused the Coast Guard to take a critical look at the suitability of the Account 19 process for these smaller activities [41].

While there was, and still seems to be some sentiment for eliminating all formal accounting at Non-Industrial bases, the Industrial Program's sponsor,

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[1]The reader may remember that Groups are usually collections of operational units. Historically many Groups have had small Maintenance and Repair activities associated with them whose task is to provide those depot level maintenance services which are beyond the routine maintenance capabilities of the local units themselves.

Chief Coast Guard Headquarters Office of Engineering wisely foresaw the possible loss of control and distortion of servicing unit costs that would result if all cost accounting were eliminated and sought instead to implement a work order accounting system that would offer clerical simplicity yet retain those Account 19 features considered to be critical. The resultant system, which went into operation in August of 1976, will be referred to in this paper (for want of a more formal name) as a "Chargeback" Accounting System because its principle feature and use is to collect and cost work order charges back to benefiting units.

While previosuly discussed units were either unique as was AR&SC or generally typical of their counterparts elsewhere in the Coast Guard, as was Support Center Portsmouth, the research conducted for this chapter found such diversity in the way the Chargeback System is used and implemented that a discussion of its workings at only one unit could be misleading. Therefore, this chapter will depart from the unit case study format used thus far and examine the Non-Industrial Chargeback System as it was designed by Coast Guard Headquarters. The degree to which the system responds to management information needs will be generalized based on discussions with management in the First, Seventh, Eighth and Ninth Coast Guard Districts.[2]

B. FINANCING AND ACCOUNTING

As was the case at AR&SC, there are two accounting/financial control mechanisms that impact upon the Non-Industrial activity. First, because all Coast Guard activities holding Obligation Authority are responsible to avoid

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[2]First District - Massachusetts, Maine
Seventh - Florida
Eighth - Gulf Coast
Ninth - Great Lakes

overobligation of funds made available to them, some type of memorandum records must be maintained at the unit level to facilitate the fiduciary or caretaker functions. Second, and most important, is the Chargeback system previously mentioned. Before getting into a detailed discussion of these systems, however, let us digress a bit to examine the origins of the resources the Non-Industrial Engineering Support Activity has available to it.

1. Financing

As the reader may remember from the previous chapter, District and Headquarters unit operating budgets originate from administrative divisions of funds controlled by Headquarters Obligation Guide managers. Besides the Engineering Support Obligation Guides we were interested in earlier, there are also obligation guides to cover such expenditure categories as Military Pay, Training, Reserve Administration Research and Development and a rather broad general obligation guide category called OG-30 which has as its purpose the funding of the Coast Guard's day-to-day operating activities. It is this OG-30 money which funds virtually all Coast Guard activity at the local level including the majority of the services provided by our Non-Industrial servicing units.

OG-30 funding comes to the Commanding Officer of the unit housing a Non-Industrial support function in the form of an administrative allotment of District funds known as an OPTAR. The amount each Commanding Officer receives is determined by the District's OG-30 Administrator (usually the Comptroller) based on the unit mission, past historical expenditure data relative to utilities, supplies, fuel, etc., and the expressed wishes of the unit. The OG-30 Administrator's considerations will also include the expected level of engineering support the Non-Industrial function will be expected to provide during the year with past service activity and the intentions of District Engineering Support Managers being of importance. Once allotted, the Command's OPTAR is

locally divided into additional administrative subdivisions called Point Accounts which are established either by the Commanding Officer or are the product of a local budget process in which each unit division officer (including the Industrial Division Officer) competes for a share of the available funds. OG-30 funding made available to the Non-Industrial activity in this manner usually goes for minor repairs and support of the base at which it is located, Group units with which it is associated and standing work it is always assigned, such as buoy maintenance, electronics component repair or construction of minor aids to navigation devices such as day boards.

A second source of funds available to the Non-Industrial activity originates from the same Engineering Support Obligation Guides that fund the Account 19 bases. While the decision process regarding the level of Engineering Support funding that will be made available from these sources is roughly the same as that described in the preceding chapter, no similar pool of funds is set up and no industrial budget is prepared. Instead, each work order is funded on its own either by transferring funds from the Engineering Support Obligation Guide to the unit's OG-30 OPTAR or by allowing the Non-Industrial activity to directly obligate the Engineering Support OG's funds.

Principally, this District directed work either involves projects larger in scope than the Non-Industrial activity usually performs or includes work orders performed in support of units other than those the activity normally serves.

Probably the most significant difference in the financing and annual budgeting processes which effect Non-Industrial activities as compared to Account 19 bases is the fact that expected labor costs are not included in the funds to be made available to the servicing unit. Instead, labor is considered a fixed cost of running the facilities and is budgeted for and financed by

Coast Guard Headquarters in the case of military and civilian salaried labor, and by the District in the case of civilian Wage Board employees.

2. Financial Accounting System

As opposed to the financial accounting system discussed earlier with respect to AR&SC, formal financial account systems are usually not maintained at field activities. Instead, accounting is performed by the cognizant District office while the local Commanding Officer tracks his status of funds via a system of locally maintained memorandum records. Usually all that is involved is a ledger which records the amount of Obligation authority originally permitted, the total dollar value of obligation documents written during the fiscal period and the amount of unobligated authority remaining. Typically the Industrial Division officer would maintain a similar record for his own Point Account. With the exception of an occasional status report received from the District, no formal financial reports are involved in such a system.

Because the Financial Accounting system is strictly fiduciary and in no way peculiar to Non-Industrial servicing activities, further discussion of it will be limited.

3. Chargeback Accounting System

Unlike the highly ADP dependent cost accounting systems noted earlier, the Chargeback system is almost totally manual and highly dependent on the clerical abilities of the producing workforce. Basically, its mechanics are as follows:

a. As work progresses, the lead employee assigned to complete a task annotates a daily log with the description of work completed, materials used (including dollar value), man hours expended on the job and the costs of any travel performed in conjunction with the project. The daily logs, one of which is prepared for each project, remain with the work order and continue to be

updated each day until work is completed. A sample work order log is included as Exhibit 4-1.

b. At the end of each project, man hours are totaled and multiplied by a standard labor rate which is assigned annually by Headquarters. This rate is actually an hourly charge which includes both labor cost plus an allowance for overhead.[3] Daily material and travel costs are then added providing a total work order cost.

c. Either a first line supervisor or shop clerk transfers data from the daily individual work order logs to a Monthly Work Order Log (Exhibit 4-2). This document includes data from the daily logs, records the benefiting unit and date work was completed. It is mailed to the cognizant District accounting facility at the end of each calendar month where work order charges listed in the log are costed to benefiting units exactly as was done in the Account 19 system.

d. To replace the scheduling and work prioritizing features absent without the Account 19 system, the Chargeback procedures require the Non-Industrial facility to maintain a Weekly Plan of Work by Shop (Exhibit 4-3) which lists the work to be performed, the budgeted man hours, provides for the daily scheduling of manpower and records actual man hours used and materials costs incurred. The system, as envisioned by Headquarters, also requires the Industrial Officer to prepare and submit to the unit Commanding Officer an Engineering Service Activity Monthly Report which lists uncompleted work orders more than six months old and provides backlog data by shop (Exhibit 4-4).

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[3]The assumption is made here that overhead is variable with direct labor hours. Since the predominant overhead costs are leave and employee fringe benefits, the assumption probably yields a reasonably accurate overhead application. The rate is based on cost experiences taken from work executed at the Coast Guard Yard in Curtis Bay, MD.

WONO _____

	DATE	DESCRIPTION (WORK DONE, PARTS USED ETC)	PERSONNEL	MAN HOURS	MATERIAL COST $	TRAVEL COST $
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						

REMARKS

TOTAL MH			
STD LABOR RATE	X		
LABOR CHARGE	$		
+ MATERIAL	$		
+ TRAVEL		$	
TOTAL COST		$	

Exhibit -1

Exhibit 4-2

WORK ORDER LOG

6

UNIT _____ MONTHLY CLOSED WO REPORT LETTER ☐

OPFAC _____ STANDARD LABOR RATE _____

	1	2	3	4	5
DATE RECEIVED	WORK ORDER NUMBER (WONO)	TITLE	MAN HOURS USED	CLOSED WO REPORT LETTER	BENEFITING UNIT OPFAC	TOTAL COST LABOR + MAT + TVL	DATE COMPLETED

Complete columns 1,2,4, & 5 only when the W.O. is completed.

COL 1 - actual total man hours used.
COL 2 - letter identification for monthly close out report - first report is letter A etc.
COL 4 - total cost includes labor charge (MH X STD LAB RATE) plus materials and travel over $50 and not charged directly.
BLOCK 6 - Complete only on copies used for monthly report of closed work orders. I.D. letter will match letter code in Column 2 for work orders closed that period.

DEPARTMENT OF TRANSPORTATION
U. S. COAST GUARD
CCGD9-158 (REV. DEC 77) (el)

WEEKLY PLAN OF WORK & ACTUAL WORK ACCOMPLISHED

SHOP/TEAM_____ ENGINEERING SUPPORT ACTIVITY_____ WEEK OF_____

PLAN				ACTUAL											
AVAILABLE WORK, M/H TO COMPLETE, NAMES OF PERS. TO BE ASSIGNED				NAMES OF PERS. ASSIGNED, DAILY WORK ACCOMPLISHED, RECAP OF WORK ORDER COST											
WONO	UNIT & DESCRIPTION OF WORK	M/H	PERS	PERS	MON	TUE	WED	THU	FRI	REMARKS SAT	REMARKS SUN	BRIEF COST ACCT	M/H	MAT	TRAVEL

Exhibit 4-3

ESA MONTHLY REPORT

UNIT_____ DATE_____

PARI I:

Uncompleted work orders more than six months old:

DATE REC	WONO	TITLE	BENEFITING UNIT

Exhibit 4-4

PART II:

Backlog By Shop

SHOP/TEAM	MD BACKLOG	AVE SHOP PRODUCTIVITY MD/DAY	SHOP BACKLOG WORK DAYS

Clearly the system is designed almost entirely as a tool for local management with the Monthly Work Order Log the only required external submission.

C. MANAGEMENT INFORMATION NEEDS VS THE ACCOUNTING SYSTEM

The functional similarities between the Non-Industrial activities and the larger Account 19 bases result in the need for similar types of information. Where those needs are the same as previously stated, this chapter will not restate. Instead, the corresponding item from Chapter III will be referenced and the text will continue with an analysis of whether or not the Chargeback system provides for that need.

1. Information Needs of the Industrial Officer

a. Work Order Status in Terms of Dollars and Man Hours Expended vs Allowance for the Jobs

Two benefits of having work order status information in this format are seen. First, the assumption is made that work done within material and man hour allowances is work done efficiently. Thus, without resorting to the promulgation of standard costs and labor times the Industrial Officer is provided with an overall performance measure for his work force. Second, having actual vs allowed materials and labor hours provides the Industrial Officer with the information he needs to make required oral briefings to his Commanding Officer and higher management levels. Typically, such briefings are required weekly.

Maintaining a weekly Plan of Work as is required under the system provides the desired measure of actual man hours vs the work order estimate but does not provide a similar comparison for materials. Such a comparison can be made available by matching actual material costs captured by the Weekly Plan of Work against the original material estimate recorded on the work order document (Exhibit 4-5).

Exhibit 4-5

DEPARTMENT OF TRANSPORTATION
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NON-INDUSTRIAL WORK ORDER

80202.7 SAMPLE OF MWO TYPE I

PRIORITY: ROUTINE

WORK ORDER NO.: M 123-74

INDUSTRIAL ACTIVITY: BASE MAYPORT, FL.

SECTION I - UNIT TO BE CHARGED (For Completion by Requisitioner)

UNIT NAME	TRADE CODE	DOC TYPE	APPN CODE	FY	ADM ALLOT UNIT	B/O	SUB ACCT NO	SUB ACCT FIELD	COST ACCOUNT	OBJ. ACCT.	DATE REQUIRED
STATION PORT CANAVERAL	AA	G	1	4	07	30	00	GD	30317	2514	1 October 1973

DESCRIPTION OF WORK TO BE PERFORMED

1. Provide labor and materials to replace/repair rotting section of floor in Building T-201, Berthing Space. Approximately 200 sq. ft. of floor needs repair.

SAMPLE

MATERIALS REQUIRED

Copy to:

1 - CCGD7(ei)
5 - CO Base Mayport
1 - CO STA Port Canaveral
1 - GRUCOM MAYPORT
1 - GP MAYPORT-Storekeeper Acct. 30 00 GD

REQUESTED BY	APPROVED BY	DATE APPROVED
CHIEF I. M. READY	LT R. U. GOODE, GROUP CO.	14 Sep 1973

SECTION II - COST SUMMARY

MAN HOURS ESTIMATED (For Completion by Engr. Div. or Ind. Unit)	MAN HOURS ACTUAL (For Completion by Accounting Office)	DESCRIPTION	AMOUNT ESTIMATED (For Completion by Engr. Div. or Ind. Unit)	AMOUNT ACTUAL (For Completion by Accounting Office)
		DIRECT EXPENSES-		
10		MATERIALS:		
		STOCK ISSUES		
		DIRECT PURCHASES		
		TOTAL MATERIALS	175.00	
		TRAVEL		
		OTHER		
		INDIRECT EXPENSES-OVERHEAD		
		TOTAL	175.00	

DATE COMPLETED: ORIGINAL

COMPLETED BY (Signature)

ACCEPTANCE OF WORK BY UNIT (Signature)

B-10

b. When Money was Spent, For What and How Much?

Answers to these questions help the Industrial Officer to discharge his fiduciary responsibilities and to pinpoint where unnecessary work order costs may have been absorbed.

While the Weekly Plan of Work and the Daily Work Order Log contain travel and materials cost information, neither document specifically identifies individual expenditure transactions as seems required. As a result, the desired information must be obtained either from the Industrial Officer's memorandum accounting records or from actual obligation documents.

c. Monitor of Individual Worker Performance

There seem to be at least two reasons why an Industrial Officer requires information on the performance of an individual worker. One hinges on the fact that Non-Industrial Bases are small and in some cases employ only one or two workers in any single trade. Making accurate work order time estimates then requires a knowledge of each worker's work patterns, skills and work pace. In a related vein, the Industrial Officer needs individual worker performance data to identify if the individual needs more training or even if the worker is capable at all of taking on given tasks.

Although the Chargeback system does not explicitly address this issue, both the Daily Work Order Log and the Weekly Plan of Work provide a portion of the raw data the Industrial Officer needs to assess performance by individual employee in that they both require a listing of the personnel used and work performed.

d. Unit Expenditure/Engineering Service History

Since the funding support decision seems largely based upon prior years' activity levels, a means must exist for the Industrial Officer to document past service expenditure by source of work order funding (i.e., was the

work order funded by OG-30 or an engineering support obligation guide). Principally, the Industrial Officer would use this information to justify his claims to a share of the unit's annual OG-30 allotment and to assist the Commanding Officer in justifying the larger unit OG-30 OPTAR.

Although the Monthly Work Order Log submission provides information which would enable a reviewer to develop an expenditure history, it does not, as designed by Headquarters, break expenditures down by funding source. One district contacted has designed a modified monthly log to compensate for this deficiency.

e. Why Do Seemingly Similar Jobs Differ?

Many tasks performed by in house maintenance activities are repetitive or so similar one would think material costs and labor times would also be quite similar. Frequently, however, this is not the case and in such situations, the Industrial Officer feels the need to identify the source or reasons for the difference or variance, both to improve future estimating and to identify any problem areas that may exist.

Although the Chargeback system does not directly respond to this issue, comparison of individual work order logs may identify such factors as personnel assigned or travel costs which may account for part of the difference in time/materials costs experienced on otherwise similar projects. This does require considerable manual effort.

f. Information to Justify Additional Capacity

See Chapter III, Information Needs of the Industrial Manager, paragraph f.1.

As is the case with the larger Account 19 activities, a method of reporting industrial activity by major class of service or by trade is needed.

Under the current system, work order costs or hours are not aggregated or reported in this manner.

2. Information Needs of the Commanding Officer

a. Unit Expenditure/Engineering Service History

Covered under "Industrial Officer."

b. What Units Are Being Serviced and What Service is Being Provided?

As pointed our earlier, one sometimes distinctive feature of Non-Industrial bases is that they may have become specialists in one or two service areas. Usually, these services become part of the unit's OG-30 budget base and it performs the service free of charge for all customers. Knowing what units have been receiving these services and in what quantities helps the Non-Industrial activity Commanding Officer prevent abuse of the free service system and enables him to prioritize competing demands for service on the basis of which of several requestors has received the activity's assistance most recently.

While the Chargeback system's Monthly Work Order Log and Weekly Plan of Work do identify benefiting units, these documents probably provide much too great a degree of detail for the Commanding Officer to use effectively in this regard. An analysis of work by type of project and/or by benefiting unit would probably be more helpful but could currently be made available only by incurring an additional administrative load.

c. Work Order Status Information

Covered under "Industrial Officer."

d. What is the Impact of the Maintenance Function on the Associated Operational Units?

As reported earlier, many Non-Industrial activities are closely associated with collections of operationally oriented ("Group") units. Frequently, the servicing activity Commanding Officer is also the Group Commander.

It is only natural that the Commanding Officer would wish to monitor the impact of the Non-Industrial activity on the associated operational mission. There are at least two methods of doing this. One method would be to conclude that operational needs are more likely being attended to if work is being completed on time, while a second would be to examine how closely current work matches stated command priorities.

Both the Weekly Plan of Work and the Engineering Service Activity Monthly Report (with its uncompleted work order and shop backlog features) address the question of tiemly completion while an examination of the "Description of Work" column of the Weekly Plan should satisfy the Commanding Officer regarding the degree to which current projects reflect command priorities. Some units have added additional local reports to the system which specify required completion dates, shops or workers responsible, and the actual completion date. The view of such additional reports is to enable management to follow up on any work orders or shops where delays could eventually have an operational impact.

e. What is the Impact of the Maintenance Function on the Larger Unit's Financial Status?

The Non-Industrial activity can impact the larger command's financial picture through the quality of its estimates and through the quality of preparation/handling of Obligation documents and District directed work orders. Specifically, if the cost projections are overstated, the maintenance function will tie up more of the unit's OG-30 OPTAR than necessary. Conversely, if estimates are consistently too low, nonmaintenance point accounts may have to be reduced later in the year to fund the maintenance function's operations. With respect to the bookkeeping questions, the Industrial Officer's staff must be careful that work done and materials purchased on behalf of District

Engineering Support Managers is properly charged to Engineering Support Obligation Guides rather than the local activiities' OG-30 funds.

Estimating quality, as far as man hours required, can be partially checked by reviewing the Weekly Plan of Work. As mentioned earlier, however, materials estimating quality would have to be determined by comparing the actual work order estimates provided on work order documents against the actual materials costs recorded on the Weekly Plan. The Industrial staff's estimating quality can also be checked quarterly or annually by balancing actual OG-30 expenditures against the Non-Industrial activities locally established Point Account balance. Bookkeeping accuracy on the other hand can only be monitored through a manual audit of Obligation and work order documents.

f. Data to Make Strategic Recommendations

One of the most frequently mentioned strategic decisions the Commanding Officer may be asked to make a recommendation on involves the decommissioning of a unit and the amount that might be saved by shutting down, while a second strategic question frequently broached involves major asset (or unit) replacement.

Making recommendations on either of these two questions requires historical maintenance cost data by unit which is one of the principle features of the Chargeback system.

g. Information to Justify Additional Capacity

Covered under "Industrial Officer."

h. Work Order Data Presented in a Simple Format

Although there is no known requirement for the Commanding Officer of a unit which houses either an Account 19 or Non-Industrial activity to be an engineer or a financial specialist, the operational nature of many of the units

which house Non-Industrial functions tends to ensure that such a CO is neither. In this case the Commanding Officer, if he is to manage effectively, must have data pertinent to the maintenance operations presented in a direct and uncomplicated fashion. Specifically requested in this vein, were reports with the following features:

1. A single line report for each work order.
2. An indication of the shop working on the job.
3. The benefiting unit.
4. Percentage of work complete.
5. Time and materials expended thus far.

Although taken together the documents required by the Chargeback system provide this information, no single report fulfills the requirement on its own.

i. Method of Communicating the Maintenance Activity's Performance to the District

Since the Monthly Work Order Log reports the work complete, the total cost incurred and the date work orders were received and completed, it partially meets this requirement.

3. Engineering Support Manager Information Needs

a. Periodic Work Order Status Reports and Final Work Order Prices

See Chapter III, Engineering Support Manager Information Needs, paragraph b.

Because the Monthly Work Order Log which is the single external submission required by the Chargeback system only reports completed work, the need for current status information on uncompleted work orders is not met. As a result, many Districts require current status reports or separate uncompleted work order reports.

b. Have Funds Made Available Been Obligated?

As discussed earlier, District directed work may be funded by transfer of funds from the Engineering Support Obligation Guide to the unit's OG-30 OPTAR or the unit may be permitted to obligate directly against the Support Manager's funds. Where this latter course is taken, the Support Manager will probably make an administrative or memorandum reservation of funds for the specific Non-Industrial work order but will need to know before the end of the fiscal quarter if those funds have been obligated.

The Chargeback system does not respond to this information need. Instead, obligation information must be obtained from other sources such as the activity forwarding a copy of the obligation document.

c. Why Will More Money be Needed on a Particular Work Order?

As was the case in the previous chapter, the need for extra funds on a work order is not particularly difficult to deal with as long as there is ample advance warning and the need for additional funds does not indicate waste. This data is not reported by the Chargeback system.

d. Does the Servicing Unit Have the Correct Capabilities to Perform the Work That Will be Assigned?

Because District Engineering Support Managers rely heavily upon Non-Industrial activities to perform critical offshore or remote work, it is essential that they be sure that correct capabilities are present within the servicing unit. Although media other than accounting systems are more likely to communicate that such capabilities are not present, excess man hour reports incident to situations where tasks are performed by makeshift means could be used to substantiate the need for more adequate personnel and equipment resources.

Labor hour records maintained under the Chargeback system partially satisfy this need.

e. How Much District Directed Work Should Be Assigned to the Non-Industrial Facility in a Particular Fiscal Period?

Although labor costs are not charged back to District Engineering Support Manager Obligation Guides, as they are in the Account 19 system, District Support Managers still realize that idle labor wages are non-productive expenditures. As such, they are concerned that there are enough OG-30 funds available to keep Non-Industrial resources occupied and where there may not be, they may feel compelled to take up possible slack with specific District directed projects. In this case, having knowledge of past funding data by funding source may alert the Engineering Support Manager that the current OG-30 availability is insufficient. This will enable him to program additional Engineering Support funding. The Chargeback system, as designed by Headquarters, does not provide this information and as reported earlier, some districts have modified the Monthly Work Order Log to record work performed by funding source. It is intended that this modification will eventually provide a fund source pattern which can be used to monitor the adequacy of funding plans and allow for corrective action where required.

4. <u>District Chief of Engineering/District Industrial Manager Information Needs</u>

a. Periodic Work Order Status Reports

Covered under "Engineering Support Manager."

b. Information to Assist in Work Scheduling

Although work scheduling is primarily a local function, District Industrial Managers at some locations throughout the Coast Guard must expend a good deal of energy to insure that an adequate project load is available throughout those periods of the year when adverse weather precludes extensive outdoor work. To insure that a sufficient level of indoor work is available, these managers must know what work is planned for accomplishment during the

year and what types of work the local unit is capable of during adverse weather periods. While planned projects information is only available through communications with District Engineering Support Managers, it is possible to partially gain information on the unit's capabilities during adverse weather periods through a review of Monthly Work Order Log submissions for those months when maintaining an adequate indoor work load is a problem. With this information, the District Industrial Manager can delay suitable nonemergency work promulgated by Engineering Support Managers until those times of the year when that work would be most beneficial in terms of ensuring full crew utilization.

c. Unit Expenditure/Engineering Service History for OG-30 Budgeting Purposes

Covered under "Industrial Officer."

d. Information to Judge Performance Against Standards

See Chapter III, District Chief of Engineering/District Industrial Manager Information Needs, paragraph a.

Although performance standards and variance from standards are not a part of the Chargeback system, comparison of Monthly Work Order Logs which do identify type of work performed and man hours used, the District Industrial Manager can identify significant man hour differences between units for the same type of work. Thus advised, he is in a position to investigate those differences and suggest changes in technique which may improve performance on a common task for all units under his cognizance. The disadvantage here is that the necessary log comparisons require extensive manual effort.

e. Periodic Work Order Status Reports

Covered under "Engineering Support Manager."

f. Why Will More Money be Needed on a Particular Work Order?

Covered under "Engineering Support Manager."

g. Data to Ensure That the Servicing Unit is Being Used Cost Effectively

Because labor costs are born neither by the Non-Industrial activity for OG-30 work nor by District Engineering Support Managers for District directed work, this perceived "cost break" may tempt managers to utilize the activity where contract services would be cheaper to the Coast Guard. To avoid this situation there must be a means to determine the full cost of utilizing the Non-Industrial facility.

While the system does not deal with actual full costs, the absorbtion by work orders of actual material costs plus an allowance for labor and overhead probably provides a reasonably accurate approximation of full costs. Manually analyzing the Monthly Work Order Log could permit aggregation by type of work (i.e., engine repair, boat overhaul, etc.) or by facility against which private sector costs could be compared.

h. Ability to Provide Operators With Information as to How Much it Costs to Run Their Units?

Although Engineering services such as those provided by Non-Industrial activities are only one part of the cost of running any Coast Guard unit, the Chargeback system does contribute information on that protion of total cost through the system feature which allocates work order costs to benefiting units.

D. CONCLUSIONS, RECOMMENDATIONS AND PROBLEMS

A major difficulty inherent in making any conclusive statements about the effectiveness of the Chargeback cost accounting system is the wide diversity in implementation techniques. While some Districts have maintained as tight

a control system as existed under Account 19, others have used the authorized departure from formal industrial accounting as an excuse to abandon all but the most prefunctory accounting technique. In that respect, this chapter's report has been somewhat unrealistic in that it deals with the Non-Industrial system as designed rather than how it actually functions. For this reason, it might be helpful to examine some of the departures from design that have occurred, and the specific problems these diverse implementation practices have caused:

1. Incomplete assignment of industrial costs. One district surveyed requires an accounting only for District directed work or for work done on behalf of units outside the Non-Industrial activities' normal servicing area. In another case a Non-Industrial unit which maintains servicing capability in three functional areas (buoy maintenance, electronic repair and public works) only applies the Chargeback system to costs incurred by one of the functions. No cost accounting is performed relative to the other functions. In a third case, all of the costs associated with maintenance of a widely scattered group of major unmanned offshore aids to navigation accrue not to the affected structures but to the servicing Non-Industrial base.

In each of these cases the servicing command unnecessarily absorbs costs incurred for the benefit of others significantly distorting its own apparent operating costs while understating the costs of units or programs it has served. This is contrary to one of the basic intents of the Chargeback system.

2. There is evidence of lax funds control and lax accounting procedures. One specific questionable practice in this area was the transfer of Engineering Support funds to unit OG-30 with no post-completion follow up to reclaim any excess funds. A second departure from Chargeback procedures allowed the servicing unit to keep a running total of materials used during the period

rather than charging each work order with its appropriate material costs. At the end of the period in this case the District Accounting Branch simply allocated the total materials cost for the period to benefiting units in proportion to service man hours worked on behalf of the beneficiary.

Although the first practice could probably be condoned on the assumption that differences between actual and estimated work order costs are immaterial over the course of a fiscal year, the second practice leaves ample room for significant errors in work order costing to the point that cost assignments are of questionable usefulness.

3. Most Districts have found the need to supplement or modify the reports required by the Chargeback system. Where the Headquarters conceived system only required a single report, the Monthly Work Order Log, one district contacted now requires two monthly and one quarterly submissions while another requires three monthly reports. Additional information which seems to be sought is uncompleted work order status, recaps of costs by supporting obligation guide and status of expenditures against funds provided directly from District Engineering Support OG's. In addition, one district has promulgated a seemingly uncomplicated but rather lengthy series of internal reports that analyze work order costs by serviced unit, supporting obligation guide, month and quarter for budgeting purposes.

4. While Engineering Support and District Industrial Managers seem to be particularly interested in the information made available via the Chargeback system, they are only one segment of that group of policy makers who decide resource allocation issues. Regrettably, it seems that few outside the Engineering community share an interest in the existing man hour and material cost accounting mechanisms.

While the comments above rightfully imply that there are significant problems with accounting as practiced in the Non-Industrial sphere, the institution of the Chargeback system seems to have had the advantages of eliminating the need for clerical manpower in a few locations and has raised the level of utilization to one hundred per cent at almost all Non-Industrial servicing units. What needs to be done to make the system effective, however, is the adoption of reporting modifications such as those already developed by some of the districts and correction of those units who have applied the accounting system on an incomplete basis.

V. COAST GUARD TRAINING CENTER ALAMEDA, FACILITIES ENGINEERING DIVISION

A. BACKGROUND

Located on Government Island in Alameda, California, Coast Guard Training Center Alameda is one of two Coast Guard units which has as its primary function the training of enlisted recruit personnel. It is currently one of the largest of Coast Guard units, having a permanent party of about 350 and a student population of 637. Although recruit training is the unit's primary function, it also supports reserve training, and has from time to time home ported major West Coast floating units. The Training Center, like AR&SC, is a Headquarters controlled command.

The Training Center's Facilities Engineering Division, with which this chapter deals, is responsible for the maintenance of the unit's 687,500 square feet of building area, most of which is of pre-1945 vintage. These responsibilities are discharged with a crew of three officers, forty-seven enlisted personnel, nine civilian employees and an annual budget availability of $550,000. Functional capabilities represented by the Division include structural, electrical and mechanical repair and maintenance, gardening, painting, vehicle maintenance and fire protection. As is typical for a Public Works activity, the majority of the Facilities Engineering Division's work is categorized into emergency work, service calls and scheduled maintenance with the activity occasionally attempting minor construction projects.

B. FINANCING AND ACCOUNTING

The financing and accounting system used by the Facilities Engineering Division is the second so called "Non-Industrial" financial control device to

be examined by this paper. Although the methods of accounting for in house maintenance resources employed do not include formal cost accounting mechanisms of the type used at AR&SC and Support Center Portsmouth, the unit does utilize a systematic method of accounting for the resources used to complete each project it attempts.

Basically, there are two accounting/financial control systems that affect the facility's Engineering Division. The first is the unit's Financial Accounting system which has as its only purpose the maintenance of fiduciary control over the funds allotted to the Training Center as a whole. Peculiar to the Facilities Engineering Division, is a Work Order Accounting System which, true to its name, facilitates the accounting for funds and time used in the performance of the maintenance function. The unit has given this device the title of Maintenance Management and Control System.

1. Financing

The Facilities Engineering Division performs its mission utilizing funding authority from two sources; one is simply an amount allocated from the Training Center's operating budget and the second is a direct allotment from the shore unit maintenance program manager, Coast Guard Headquarters Civil Engineering Division.

Operating budget funding is obtained through the annual budget process which begins with each Training Center division preparing a list of its own expected requirements for the next year's operations. The Training Center's comptroller compiles the division funding requests and justifications for submission to Coast Guard Headquarters and the Training Center competes for

funding on a footing similar to District Commands.[1] Accordingly, allotments to the unit originate with Headquarters managed obligation guides much the same as was described in Chapter IV for Non-Industrial activities. As might be expected from this similarity, a rather substantial pool of funds available for day-to-day Training Center operations falls under the "general" OG-30 category. Once received, the OG-30 allotment is made available to Training Center division officers on a pro-rata basis with the original budget submission. Obligation authority and accounting for this money is affected through a system of administrative reservations called Operating Guide Targets.

The Facilities Engineering Division receives about five per cent of the total Training Center OG-30 budget, an amount which makes up nine per cent of the total funding authority it has available. The intent of this funding is to pay for the unit's routine service calls, emergency work and normal structural, electronical and mechanical maintenance.

The second source of funds for the facility's Engineering Division is a direct allotment of the Headquarters Civil Engineering Support Manager's funds called OG-43. The purpose of OG-43 allotments are to fund such reasonably large non-annually recurring repairs as building reroofings, interior rehabilitative work and mechanical system replacements. Generally, expenditures for such projects are limited to $75,000 to ensure that they remain within the scope of design life maintenance repairs as opposed to structural replacements which require separate Congressional approval.

OG-43 funds are obtained through a rather unique Zero Base budgeting procedure designed by the Headquarters Civil Engineering Division in 1971.

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[1]Although this system is generally incremental in nature, the unit for FY 80 submitted a parallel presentation in Zero Base form. Once Zero Base submissions become standard procedure, the method of distributing Operating Budget funds to divisions will undoubtedly change from the procedures described herein.

Basically it operates in accordance with the following sequence of events:

a. The Facilities Engineer identifies and maintains a list of repairs and maintenance projects meeting OG-43 requirements that will have to be undertaken within the next five years. This "backlog," together with a preliminary cost estimate for each planned project is forwarded quarterly to the Civil Engineering Division under the heading of OG-43 Project and Funds Status Report (Exhibit 5-1).

b. Prior to the beginning of each fiscal year, the Facilities Engineer augments his Project and Funds Status Report with an OG-43 budget submission containing two estimates; the minimum OG-43 allotment felt necessary to meet the needs of the shore plant and operational programs he must support and, an estimate of the Division's maximum capacity to expend funds subject to the constraints of staff capacity and other work loads.

c. The inputs above are coded and fed to a computer program that processes a device called the OG-43 Algorithm. The Algorithm is a multiple regression analysis of past expenditures against a series of variables which are thought to correlate with the need for funds (e.g., building area, a geographical cost index, the type of organization, et.). The Algorithm balances the regression against such factors as discrepancies in plant condition, stated fund requirements and staff/workload constraints and recommends an appropriate level of OG-43 funding for the unit.[2] Once allocated, the unit's OG-43 funds are used primarily to finance outside contract effort, however, a significant percentage of the available OG-43 funding is utilized to fund major construction projects executed by the Facilities Engineering Division workforce.

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[2]Peterson, Walter E., CDR, USCG, "Zero Base Management System," The Military Engineer, No. 445, p. 372, Sep-Oct 1976.

(HYPOTHETICAL DATA) RCS G-ECV-3081
OPERATING GUIDE 43 PROJECT AND FUNDS STATUS REPORT
PERIOD: 2nd QTR, FY 1975

FROM: COMMANDER, FIFTH COAST GUARD DISTRICT TO: COMMANDANT (G-ECV)

CON	SER	UNIT	OPFAC	PGM	C	DESCRIPTION	CAT	EST	PRI	CNT	NXT	FTR	PC	O/C
	2006	OCEAN CITY STA	0530292	OSR	P	CONSTRUCT FUEL BASIN	B	3	4				0	52
	9021	ECAB	0531510	OSR		REPLACE SWITCH GEAR	M	30	40				8	53
	2004	OCRACOKE STA	0530295	OSR		BULKHEAD REPAIRS	M	15	14				0	52
	3005	MILFORD HAVEN STA	0530287	OSR	P	MODIFY SEWAGE SYSTEM	B	24	29				6	62
999	4032	THOMAS PT SHL LS	0541303	WAN		STRUCTURAL REPAIRS	M	24	23				7	54
2	3006	CAPE HENRY LS	0541280	WAN	H	REHAB KITCHEN	M	5		5			6	61
5	0012	PORTSMOUTH BASE	0531140	WAN		REPAIR FINGER PIERS AND RENEW CAMELS	M	15		3	12		4	53
6	4002	ECAB 61	0530510	OSR	S	FIRE PROTECTION IN MAIN BARRACKS	B	30		37			6	61
999	5001	CAROLINA B LORSTA	0540117	WAN	T	TOWER REPAIRS	M	30		29			6	54
1	3002	PORTSMOUTH BASE	0531140	WAN	R	CLASSROOM LIGHTING	B	15			15		2	53
3	4007	OAK ISLAND STA	0530289	OSR	C	AIR CONDITIONING	B	8					1	C
4	4006	LITTLE CREEK STA	0530277	OSR		REHAB HEATING SYSTEM	M	10			10		2	53
7	2002	SMITH PT LT	0573200	WAN		INSTALL LADDER	B	3			3		3	53
8	4010	COVE POINT LS	0541282	WAN	H	EXTERIOR PAINTING	M	5			5		1	53

Exhibit 5-1

One feature of the financing system which impacts both on the budget process and on accounting is the fact that the Facilities Engineering Division does not budget for its labor costs. Instead, the amounts required to pay for Division labor services are budgeted for and financed separately by a Headquarters controlled appropriation for military labor and by a separately administered OG-30 account for civilian wage board employees. For this reason the Facilities Engineering Division charges neither direct labor nor labor related overhead to the cost of work it performs.

2. Financial Accounting System

The financial accounting system is essentially a fiduciary device which deals almost exclusively with the status of obligations against available funding authority. Ordinarily it would not be looked at extensively but since none of the reporting mechanisms associated with the Maintenance Management and Control System provide necessary status of funds information to the Facilities Engineer, close contact with the Financial Accounting System is important.

From the Facilities Engineer's point of view the financial accounting system is very simple. As he finds it necessary to make a purchase, an obligation document is prepared and annotated with the dollar amount, the point account the Facilities Engineer is responsible for and an object code which basically attempts to disclose what the expenditure is being made for.[3] If an expenditure has been made in behalf of a work order, a memorandum record of the amount is kept for later posting to the work order document. Such records are the only interface between the work order accounting system and the financial accounting system. Finally, obligation documents are forwarded to the

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[3]Examples of object codes titles pertinent to the Facilities Engineering Division are utilities expenditures, equipment replacement, fuel, housekeeping, services expenditures and supplies.

Training Center's Accounting Division where the actual obligation is verified and the Facilities Engineer's Operating Guide Target balance is reduced by the expenditure amount.[4]

The financial accounting system provides only one report of interest to Facilities Engineering Division management, the Biweekly Financial Report. As disclosed in Exhibit 5-2, its features include the original Obligation Guide allotment (labled Operating Guide Target), the amount of the funds obligated, purchase requests in progress and the amount of obligation authority still available. Besides the Biweekly Report, the Facilities Engineer is able to get a verbal status of funds report that is accurate within a few dollars at almost any time.

3. Maintenance Management and Control System

Despite the fact that the Facilities Engineering function differs from the traditional Industrial role only in that the Industrial activity is multifunctional where the Facilities Engineering activity performs exclusively in the Public Works sphere, past Coast Guard attitudes seemed not to fully recognize the similarities. It appears that these attitudes had prompted Facilities Engineering Managers to look at the labor force as a free commodity, encouraged the Facilities Engineer to focus on fiduciary as opposed to resource

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[4]This explanation has been simplified somewhat for the reader untrained in government financial procedures. The mere preparation of a requisition or purchase order does not mean that funds have actually been obligated. For example, a requisition prepared with the intent of making a purchase from government stock is not an obligation until the desired stock has been dropped from inventory and earmarked for the receiving unit. This is reflected in the Financial Report's column marked Purchase Requests in Process. This is particularly critical at the end of the fiscal year because Purchase Requests in Process at that time will be obligated against the next fiscal year's funds, not those of the year in which the requisition was originally written.

FINANCIAL REPORT FOR PERIOD ENDING 25 JULY 79

OG 30 - QRTLY ALLOT 275,000.00 + MODS 9,000.00 + CARRYOVER 10,241.77 = TOTAL AUTH. FUNDS 301,194.77

VAR 7,700.00

		Oper. Guide Targets	P.O.P. Changes	Funds Obligated	Admin. Reserve.	Unoblig. MO	Purchase Requests in Process	Balance Available
300000	OPERATION & MAINT.	143,753.00		42,669.00	33,483.71	77,239.00	-0-	603.06
	CARRYOVER	10,241.77						
	TOTAL	153,994.77						
300001	GEN. ADMIN.	2,500.00		239.46			256.10	2,004.44
300002	TRANSIENT ADMIN.	500.00		9.41			-0-	490.59
300003	PUBLIC AFFAIRS	700.00		481.12			-0-	218.88
300004	RECRUIT TRAINING	16,400.00		1,850.77			9,771.64	4,777.59
300005	R.T.S.B.	10,000.00		66.27			31.20	9,902.53
300006	WAGE BOARD LABOR	46,000.00		-0-			-0-	46,000.00
300007	RECREATION	5,500.00		[469.86]			148.50	5,821.36
300008	MEDICAL - HSD	15,200.00		7,030.83			2,016.48	6,152.69
300009	DENTAL - HSD	10,500.00		2,714.04			3,583.55	4,202.41
300010	COMPTROLLER	15,000.00		1,641.46			8,040.46	5,318.08
300011	PUBLIC WORKS	15,700.00		1,661.32			4,727.27	9,311.41
300012	SMALL BOATS	8,000.00		[19.35]			2,541.57	5,477.78
300013	CHAPEL	1,200.00		252.45			177.44	770.11
300014	DRUG REHAB.	-0-		-0-			-0-	-0-
	TOTAL	301,194.77		58,126.92	33,483.71	77,239.00	31,294.21	101,050.93

Exhibit 5-2

OPERATING GUIDES

		Oper. Guide	Oper. Guide/ Allot. Mod.	Funds Obligated	Admin. Reserv.	Purchase Requests In Process	Balance Available
ELECTRONICS PROGRAM CARRYOVER	420000			-0-		-0-	39.49
		39.49					
TOTAL		39.49					
SHORE UNIT CARRYOVER	430000	50,000.00		8,136.29		38,978.80	7,008.95
		4,124.04					
TOTAL		54,124.04					
PERS. TR. & PROC. CARRYOVER	560000	6,000.00		462.50		180.00	5,375.32
		17.82					
TOTAL		6,017.82					
PROC. MEDICAL CARRYOVER	570000			-0-		-0-	44.58
		44.58					
TOTAL		44.58					
A C AND I 50.01.33 CARRYOVER		6,015		5,900.00		-0-	115.33
		6,015.33					
TOTAL		6,015.33					
59.01.22 CARRYOVER				-0-		-0-	4.82
		4.82					
TOTAL		4.82					
59.01.31 CARRYOVER				-0-		15,000.00	895.58
		15,895.58					
TOTAL		15,895.58					
59.01.33 CARRYOVER				-0-		-0-	135.80
		135.80					
TOTAL		135.80					
CARRYOVER							
TOTAL							

Exhibit 5-2

management responsibilities and in the case of more than one third of the Coast Guard's Facilities Engineering activities allowed the application of resources in the absence of any kind of work order system.[5]

Faced with an aged shore plant, the surfacing of critical but unanticipated major repair requirements, complaints that certain types of facilities were receiving a disproportionate share of the maintenance effort and with challenges to its' budgetary requests becoming increasingly less tolerable, the Civil Engineering Division of Coast Guard Headquarters found in 1978 that it could no longer allow itself the luxury of such attitudes. Accordingly, it directed the development of a standardized method of accounting for both facility conditions and the use of in house maintenance resources. Although the principle impetus for such a system was to develop information for Headquarters use, it became quickly apparent that any system developed could and should respond to the management information needs of local facilities Engineers as well. As a result, a new word entered the vocabulary of the Coast Guard Civil Engineering Manual (CG-251); accounting. Not cost accounting, although an accounting for the cost of materials (estimated and actual) was to be included as part of the system, but man hour accounting and work load accounting which would aid the Facilities Engineer in identifying structures which consumed excessive maintenance effort, identify work groups with chronic personnel deficiencies or who were being underutilized, document requests for additional resources and identify areas for management improvement effort. With this "new" concept came the inception of Maintenance Management and Control System.

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[5]Commandant (G-ECV) U.S. Coast Guard, Commandant Notice 11010, Subject: Adequacy of Coast Guard Shore Plant, 25 April 1979.

The Maintenance Management and Control System as practiced at Training Center Alameda is manual in nature and dependent on accurate input from all levels in the Facilities Engineering Division. The system begins with the issue of a Facilities Engineering work order from the Division's maintenance scheduler to the shop principally responsible for the work. Besides a location and description of the work to be performed, the work order contains a three letter code identifying whether the work order is:

a.	Major	An OG-43 project
b.	Minor	Estimated at more than 16 man hours or a material cost greater than $200
c.	Service	Requires less than 16 man hours or a material cost less than $200
d.	Standing	Predictable or recurring maintenance or repair
e.	Emergency	
f.	Nonemergency	
g.	Scheduled	Having a planned start and estimated completion date
h.	Unscheduled	Assigned in random fashion

As work is performed each employee prepares a Daily Work Record Card upon which is noted the work order number, time on each work order and any time spent in training, on leave or otherwise used administratively. This record is the system's primary source document, upon which all other records, reports and analyses are based.

Daily Work Record Cards are then collected by shop supervisors who transcribe the data to a Daily Work Order Tabulation Report and a Work Order Accounting Record Sheet. The Daily Work Order Labor Hours Tabulation records the work order number and the number of hours spent in each of the primary

work order categories (major, minor, service, standing, etc.) while the Accounting Record Sheet records the hours absorbed and the materials used by each work order.

On a weekly basis the information collected on the Daily Work Records and Labor Hours Tabulation forms is used by the shop supervisor to prepare a weekly Labor Hours Talley Sheet and by the Maintenance Scheduler to prepare a weekly Shop Labor Compilation Report. Essentially these reports provide the hours available vs the hours worked and man hours applied under each work order category, by work day and by shop.

Finally, as work orders are completed, the entries to the Work Order Accounting Record Sheet are transferred to the Work Order form and by the Maintenance Scheduler to a Work Order Log which provides an historical record of each work order performed, estimated vs actual labor time, estimated vs actual materials cost and identifies the performing shop. A Data Flow Diagram to describe this process is provided as Exhibit 5-10 while pertinent documents are included as Exhibits 5-3 through 5-9.

There are two features of this system which bear reiteration. First, costs and man hours once collected remain recorded by work order only. There is no distribution of costs to beneficiaries, structures or programs. Secondly, the only costs recognized are material costs. No man hour by labor rate extensions are made to approximate labor cost and there is no effort to apply any allowance for overhead.

At the present time the information seems to be collected primarily to enable the unit to submit its one and only external report, the Facilities Engineering Management Information Report. This report (see Appendix E) which is a mandatory annual submission to Coast Guard Headquarters Civil Engineering Division is intended to gather information in four areas:

Exhibit 5-3

DAILY WORK RECORD

Name		Date			Shop	
Time Out	Time In	Hours Worked	Other Hours	Code	W.O.#	Remarks

DOT/USCG CG TRACEN Alameda 2042/3-21-78

Notes:

1. Use following code letters as needed for other hours:

   W - Training (Divisional or TRACEN)
   X - Leave (Annual or Sick) and liberty including specials
   Y - Administrative (coffee breaks, medical/dental appointments, personnel or pay problems, etc)
   Z - Unauthorized (AWOL, in confinement, etc)

2. Turn in daily to shop supervisor.

3. Indicate hours to nearest 0.1 when logging.

Exhibit 5-4

DAILY WORK ORDER LABOR HOURS TABULATION

SHOP/SECTION									
Work Order No.	Major W.O. Hours	Minor W.O. Hours	Service W.O. Hours	Service W.O. Hours	Emergency W.O. Hours	Non-Emergency W.O. Hours	Scheduled W.O. Hours	Unscheduled W.O. Hours	Remarks
Totals									

DOT/USCG CG TRACEN Alameda 2044/3-24-78

Exhibit 5-5

FACILITIES ENGINEERING WORK ORDER - ACCOUNTING RECORD SHEET Sheet __ of __			
Work Order Number		Date of W.O.	
Daily Records			
Date	Hours Worked	Material Used	Remarks

DOT/USCG CG TRACEN Alameda 2045/3-24-78

Exhibit 5-6

WEEKLY LABOR HOURS TALLY SHEET

Shop/Section								Week of_____19___							
	1. Hours Available	2. Actual Hours Worked	3. Other Hours	4. Transient Hours Available	5. Actual Trans. Hours Worked	6. Transient Other Hours	7. Overtime Hours	8. Major W.O. Hours	9. Minor W.O. Hours	10. Service W.O. Hours	11. Standing W.O. Hours	12. Emergency W.O. Hours	13. Non-Emergency W.O. Hours	14. Scheduled W.O. Hours	15. Unscheduled W.O. Hours
Sunday															
Monday															
Tuesday															
Wednesday															
Thursday															
Friday															
Saturday															
TOTALS															

Exhibit 5-7

FACILITIES ENGINEERING DIVISION

Weekly Shop Labor Hours Compilation Log

Week ending _____ 19__ | Period No.

Shop	1. Hours Available	2. Actual Hours Worked	3. Other Hours	4. Transient Hours Available	5. Actual Trans. Hours worked	6. Transient Other Hours	7. Overtime Hours	8. Major W.O. Hours	9. Minor W.O. Hours	10. Service W.O. Hours	11. Standing W.O. Hours	12. Emergency W.O. Hours	13. Non-Emergency W.O. Hours	14. Scheduled W.O. Hours	15. Unscheduled W.O. Hours
Paint															
Garden															
Structural															
Mechanical															
Electrical															
TOTALS															

The following arithmetic column totals should be used as a check after assembling your figures:

1 = 2 + 3
4 = 5 + 6
2 + 5 + 7 = 8 + 9 + 10 + 11 = 12 + 13 = 14 + 15

DOT/USCG CG TRACEN Alameda 2041/3-20-78

Exhibit 5-8

				Date
FACILITIES ENGINEERING WORK ORDER				Number
Location				
Work Code (3 digit)				Lead Shop

Work Description: _____

	Estimated	Actual
Materials Cost ($$$)		
Labor (man-hours)		

***** use this space for estimating purposes *****

Work performed by	
Shop Supervisor	Completion date

DOT/USCG CG TRACEN Alameda 2040/3-20-78

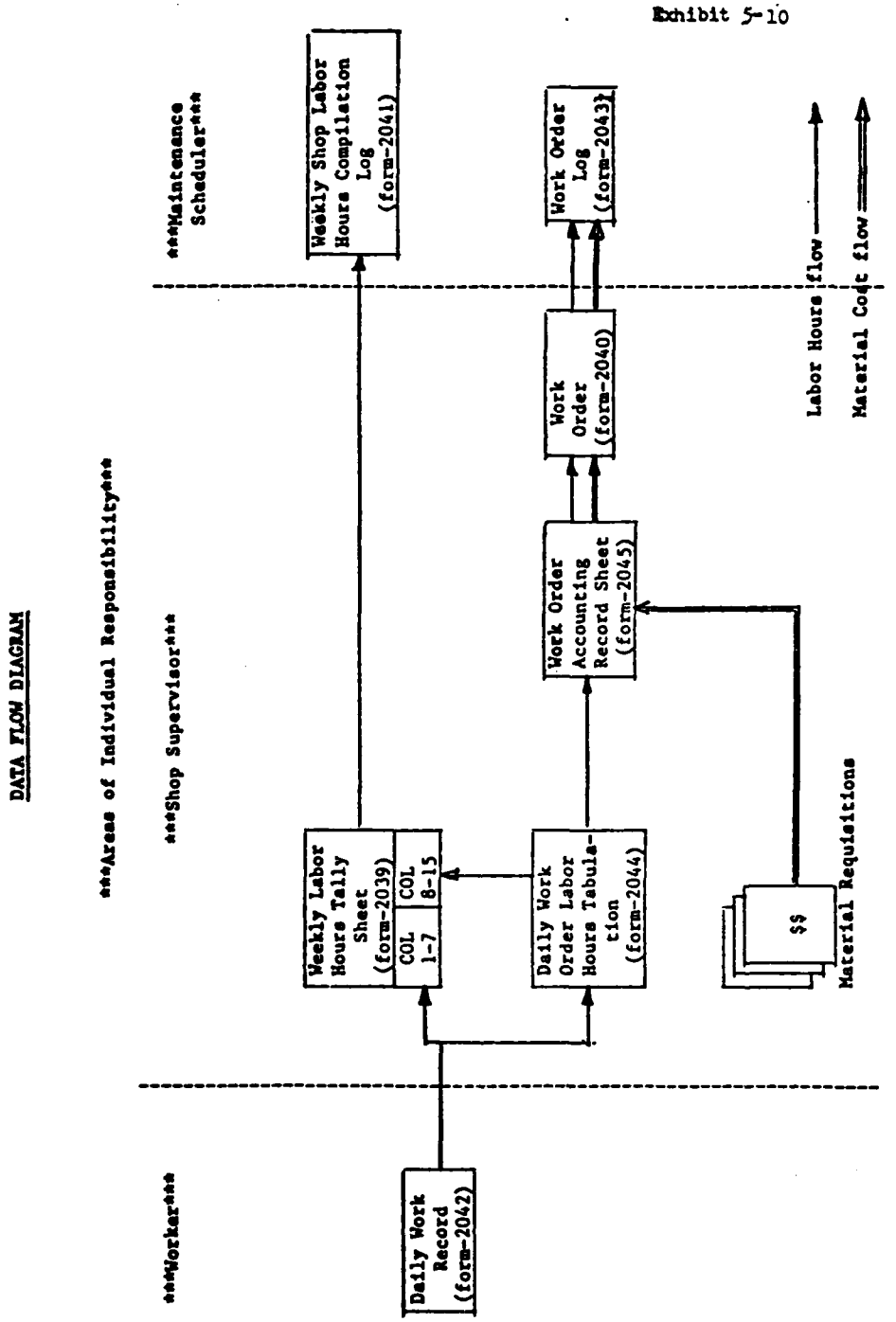
WORK ORDER LOG

W.O. NO.	Location	Description	Req. by	Date Rcvd	Est. Labor	Actual Labor	Est. Matl	Actual Matl	Section

DOT/USCG CG TRACEN Alameda 2043/3-24-78

Exhibit 5-9

Exhibit 5-10


DATA FLOW DIAGRAM
Areas of Individual Responsibility
Worker
Shop Supervisor
Maintenance Scheduler
Daily Work Record (form-2042)
Weekly Labor Hours Tally Sheet (form-2039)
COL 1-7
COL 8-15
Daily Work Order Labor Hours Tabulation (form-2044)
$$
Material Requisitions
Work Order Accounting Record Sheet (form-2045)
Work Order (form-2040)
Weekly Shop Labor Hours Compilation Log (form-2041)
Work Order Log (form-2043)
Labor Hours flow
Material Cost flow

a. Unit facilities and demographics: Included here is such information as the number of people supported by the command, the number and type of buildings that must be maintained and information on energy consumption.

b. Organization and staffing of the Facilities Engineering Division: This category calls for information as to the number of employees attached to the Division, ranks, civil service/wage grade classifications, tasks performed, salaries and the supervisor/worker mix.

c. Facilities Engineering Division financial information: Asked for under this category is information on the uses of funds by object code and the size of the OG-43 backlog.

d. Performance/Productivity data: Included here are a number of statistical and ratio analyses of work order data that yield information as to work force productivity.

The Training Center's submission is collected in Headquarters and compiled into a more comprehensive analysis entitled Facilities Engineering Management Data Summary. This document essentially compares and contrasts the responses of all Coast Guard Facilities Engineering activities with respect to the information categories mentioned above. Although the analysis is in its early growth stages and managers seem hesitant to make conclusions about its results, it is apparent that the intent of the Data Summary is to provide Headquarters with information to enable it to track the changing nature of the physical plant and evaluate the performance of each of the Facilities Engineering Divisions. Facilities Engineers, on the other hand, may be able to utilize some of the performance/statistical data to evaluate performance and highlight problem areas within their own activities and may have information against which they may be able to evaluate themselves in relation to their peers.

C. MANAGEMENT INFORMATION NEEDS VS INFORMATION PROVIDED BY THE ACCOUNTING AND MANAGEMENT CONTROL SYSTEMS

1. Facilities Engineer Information Needs

Although not easily categorized, the information needs of the Facilities Engineer generally fall into the areas of work planning, production monitoring and resource analysis. Specific information required to perform these management functions is:

a. Information on the Percentage of Work That Can Be Categorized as Service, Unscheduled or Emergency

Timely and efficient completion of specific projects can only be facilitated when proper manpower scheduling, ordering of materials and work staging can be accomplished. A roadblock to effective scheduling, however, is the incidence of routine service and emergency repair calls. The general impression among Facilities Engineering officers is that the incidence of these unplanned demands on Division resources should not inhibit scheduling but, the Facilities Engineer must have enough information about the frequency and character of such occurrences to be able to "plan" around them. Simple percentages of time spent on unscheduled work are not totally satisfactory for management's needs in this regard. Instead, some kind of analysis as to the nature and distribution of unscheduled work (e.g., which shops are more frequently involved and at what times) would be required for the Facilities Engineer to effectively deal with the unscheduled work occurrences.

The Weekly Labor Hours Talley Sheet provides information on the actual amount of unscheduled work performed on a day-by-day basis while the weekly Shop Labor Hours Compilation Log provides the same information by shop. The Facilities Engineering Management Report provides aggregations of unscheduled work performed on a total Division basis for the entire year. No statistical

analysis of this information is provided, but the above reports make raw data available to make such computations, if desired.

b. Information Upon Which to Base a Contracting Out Decision

As was the case in the in house maintenance activities previously looked at the decision as to whether a given project should be attempted in house or contracted out was based on such factors as the time available to complete the task, the existing work backlog, the effort that would be involved in preparation of contract plans and specifications, the equipment and skills required to do the work and probable costs as compared to the price private industry might charge. As far as comparative costs are concerned, materials charges would be the only costs relevant in making a decision on any single project because over the short run, the unit sees the costs of its labor force (including related overhead) as fixed.[6]

Past material costs and actual labor time for projects similar to those now being considered are recorded and reported on the Work Order Log and on the completed Work Order Document. Other critical decision factors, however, such as existing work backlog and plan/specification times are not reported as part of the Training Center's Maintenance Management and Control System.

c. Labor Hour Data by Functional Category of Work Order Performed and on a Budgeted vs Actual Basis

Two purposes are seen by having labor utilization information in these formats:

1. Having estimated vs actual records as well as the ability to chart trends in actual labor hours used provides good measures of workforce efficiency.[7]

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[6]This is generally felt to be consistent with sound accounting theory. [21]

[7]Requires that the estimator be consistent enough so that any variance noted is a reflection of workforce performance rather than of estimator's ability.

2. Actual labor utilization information could help the Facilities Engineer identify areas where labor is not being optimally utilized, where there are not enough people on the job, where effort is being wasted and can help identify physical plant items chronically in need of repair which would justify replacement in lieu of continued repair effort.

In order to serve these two purposes, labor hour data would have to be aggregated not only in budgeted vs actual format by work order but similarly by shop, trade or task type. Further, a reporting mechanism to identify trends from job to job or accounting period to accounting period would be necessary if the Facilities Engineer is to make a valid evaluation of the efficiency and proper utilization of his work force.

Of these requirements, only an actual labor hour talley by shop (Weekly Shop Labor Hours Compilation Log) is provided by the existing system. Other aggregations could be retrieved but only by manually searching the actual work order documents or the Work Order Log.

d. Work Order Follow Up Information on an Exception Basis

One of the philosophies that justified the development of the Training Center's Maintenance Management and Control System stated that once his requirements were made known, the Facilities Engineering Division customer had the right to feel confident his needs would be provided for in a systematic manner with no need on his part to constantly monitor, follow up and inquire into the status of the expected service. While this philosophy makes expediting work clearly the Facilities Engineer's responsibility, time and practicality constraints prevent him from personally monitoring the progress of every work request. While most Facilities Engineering Division work is of the one to three day variety and thus not a progress monitoring problem for the Facilities Engineer once work is started, some exception reporting device seems necessary

to identify those needs which have been reported but not acted upon in timely fashion. Such a reporting system is not part of the existing Maintenance Management and Control System.

e. Current Funds Status

Like any Training Center Division Officer, the Facilities Engineer has fiduciary responsibility for funds earmarked for his operations. In discharging this responsibility he needs to know what money he originally had available, how much he has obligated and how much obligation authority he has left. This information is clearly reported in the Biweekly Financial Report. Frequently he also has a need to know what money was spent for and precisely when it was spent. Because neither the Financial Accounting System's Financial Report nor the Maintenance Management and Control System reports adequately meets this need, the Division maintains current funds status and tracks what/when expenditure data on a separate memorandum procurement record.

f. Completed Work Order Cost

Because most Training Center jobs are of short duration, having cost data as work progresses is an infrequent requirement. End of job cost information is required, however, to provide estimating data for future similar projects and to identify unexpected materials costs or time excesses that bear investigation.

The present Maintenance Management and Control System as it allocates actual material costs and labor time to work orders provides this information.

g. Materials Use Record

Materials use information serves two purposes for the Facilities Engineer; materials cost control and inventory control. Although having a budgeted vs actual materials report for every work order (Work Order Log)

partially serves cost control purposes, effective cost and inventory control for materials can only be assured if the Facilities Engineer has an understanding of the quantity of materials ordered for a job, the quantity actually used and the amount of excess remaining. Of these, only the quantities actually used are reported under the Maintenance Management system.

h. Information to Identify Organizational Policies or Practices That Impact Adversely on Division Productivity and Costs

Frequently, an examination of key ratios or relationships can highlight a problem area or suggest a subject for further investigation. For example, one Facilities Engineer interviewed in the course of this study who frequently computed the ratio of material to labor costs to disclose the degree of labor intensity at his unit found that a higher than expected labor intensity measurement was the result of a grossly insufficient materials budget. To make up for the budget deficiency, his crew had been spending an inordinant amount of time in salvaging old but still usable materials. Armed with this information, the Facilities Engineer was able to justify a significant increase in his OG-30 budget and at the same time substantially increase the level of maintenance services that could be made available.

Although the Maintenance Management and Control system itself does not specifically report the types of indices noted above, several potentially valuable ratios covering such subjects as labor intensity, productivity and labor cost per square foot of building area supported are computed in conjunction with the submission of the annual Facilities Engineering Management Report. While these indices are probably helpful in terms of annual review, they would probably be even more valuable if available on a quarterly or monthly basis.

i. Information to Identify Those Structures That Are Receiving the Majority of the Division's Resources

Obviously, every building, structure or building subsystem (e.g., plumbing, air conditioning, etc.) reaches a point at which the resources that

must be expended to allow it to continue performing its mission exceed the scope of routine maintenance and, system or structure replacement should be considered. Normally such replacement requires an increased level of funding or in some cases a Congressionally approved construction project. In order to justify such funding the Facilities Engineer must be in a position to tell the Headquarters Civil Engineering Division exactly what the effected structure has and probably will cost to maintain in the future so that these costs can be balanced against the outlays that would be required for replacement.

In its present configuration the Maintenance Management and Control system does not provide the required information. This is true because the system does not distribute work order costs to structures and even if it did the failure of the system to collect labor and overhead would result in an incomplete reflection of the total in house maintenance effort expended.

j. Information to Justify Existing or Additional Capacity

Although in house maintenance capacity can be justified on grounds other than cost, comparative cost information becomes a major factor in making long range or strategic decisions as to the addition to or continuance of in house capacity at any location. In this case, the relevant comparative costs would be the full costs of providing the service (materials, labor and overhead).

Comparative material costs can be developed by searching past work order records. Labor and overhead costs on the other hand could be approximated by using published standard labor and overhead rates but neither these features nor actual labor/overhead charges are a part of either the Financial Accounting system or the Maintenance Management and Control system.[8]

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[8]Standard rates are based on "Average" labor and overhead costs presently being realized at the Coast Guard Yard.

k. Information to Substantiate the OG-30 Budget Request

In essence there seems to be two ways of substantiating a budget request, one very concrete and one somewhat abstract. Both would seem to be necessary to make a valid case, however. In the concrete case, the Facilities Engineer would justify his present requirements based on past costs. Both the Financial Accounting and Maintenance Management and Control systems contribute to the Division's purposes in this regard with the financial system providing data on gross expenditures and the Maintenance Management system providing details, particularly in terms of actual materials used.

The second budget justifying device would be a method of projecting the impact on the Training Center's primary mission (recruit indoctrination and training). This is much harder to do and the only contribution either system could make in this regard would be to enable the Facilities Engineer to estimate accurately the costs of keeping a structure usable. This would seem to imply the need for estimating data which the completed work order records supply, plus some indication as to the structure historically experienced full maintenance costs which is not available in any easily retrievable form.

2. Commanding Officer Information Needs

a. Information to Review the Budget Request

While budget justification is a concern of the Facilities Engineering Officer as well as the Commanding Officer, the CO's concern is not so much the actual preparation of a justification but ensuring that the budget justification is reasonable and complete. In this regard, detailed review of computations and bottom line figures presented is less than knowing what level of resources have been available in the past, what the Facilities Engineering Division has been able to do with that level of resources and what major discrepancies or problems have arisen as a result of any lack of resources.

Past budgets and actual expenditure records are available as products of the financial accounting system, specific work completed is available by reviewing the Work Order Log, and major categories of work completed are reported in the annual Facilities Engineering Management Report. Although the discrepancies and exception information that might be helpful in developing a picture of what the Facilities Engineering Division was not able to do is not available through either system, the Facilities Engineer is in a position to provide a surrogate for this information if he can estimate the incremental level of services that could be provided with additional resources. The Maintenance Management and Control system would seem to provide a data base for such an estimate.

b. What is the Maximum the Current In House Resource Levels Can Accomplish?

Obviously, another way to identify a resource deficiency is to be in a position to predict accurately the lengths to which existing resources will stretch. Although this question is not specifically addressed by either accounting system, the actual work hour and work completion data developed through the Maintenance Management system and the productivity indicators reported in the Annual Facilities Engineering Management Report could provide an information base that would enable the Facilities Engineering Division to estimate its maximum output.

c. Does the Facilities Engineering Budget Reflect Command Priorities?

Since the budget for routine, day-to-day maintenance and repair is oriented toward keeping the existing physical plant in operation, command priorities seem less an issue here than with the larger OG-43 funded projects. Neither accounting system concerns itself with this question but the question of adherence to command priorities can be partially answered by reviewing the

prioritization of OG-43 work as reflected in the earlier discussed OG-43 Project and Funds Status Report.

d. Information to Monitor the Impact of Facilities Engineering Division Work on the Training Division

Although the comments of the Training Division probably have much more impact and are more timely than any financial or work progress reports that the CO sees, two areas of consideration discussed earlier (distribution of work order costs to buildings or programs and exception reporting on work request progress) could be helpfui in confirming or validating concerns or complaints brought verbally to the CO's attention. Such reporting features are not part of the existing system.

e. Status of Facilities Engineering Division Expenditures vs the Budget

This information is required in order for the Commanding Officer to perform the oversight function and is provided regularly via the biweekly financial reports.

f. Is Facilities Engineering Division Work Quality Adequate?

Clearly this information is not presented via either the financial accounting system or the Maintenance Management and Control System. Personal observation and staff comments are, of course, the more typical avenues for answering this question.

3. Headquarters Civil Engineering Division Information Needs

a. Maintenance Costs by Structure

Essentially, the Chief, Headquarters Civil Engineering Division has the same need for cost data by structure as does the Facilities Engineer except that his concern lies more in justifying requirements for funding to Congress than competing within the organization for OG-30 and OG-43 funds. The desired information is not available via the Maintenance Management and Control system.

b. Maintenance Costs by Program

As Training Center Alameda is essentially a single program (training) command, this issue is not particularly applicable to it. Multifunctional commands, however, the need recognizes that the addition or deletion of programs or functions change the amount of in house public works resources that must be available to support that command. By distributing Facilities Engineering work order costs to programs, the Civil Engineering Division is in a position to more equitably respond to a shift in the funding resources over which it has control.

c. Prior Fiscal Year Expenditure Data in Common Format

Prior fiscal year expenditure data is one of the tools the Headquarters Civil Engineering Division uses to facilitate comparison between Facilities Engineering activities. The stated requirement as reflected in the Facilities Engineering Management Report format is for expenditure information by funding source and by object code.

Interestingly enough, neither the Maintenance Management and Control system, which is designed to feed the Facilities Engineering Management Report, nor the biweekly Financial Report provides expenditure data by object code. Instead, provision of accurate expenditure breakdowns by object code requires a manual search of the year's obligation documents.

d. Future Problem Tip Offs Provided Via an Analysis of Work Order Characteristics

The feeling among those in Headquarters Civil Engineering Division is that an examination of broad categories of work being performed is sometimes a helpful forecaster of the future. For example, a Facilities Engineering Division may have been performing an unusual amount of unscheduled or emergency work. This may be indicative of an upcoming requirement for major subsystem

or structure rehabilitation or replacement. The ability to spot such trends enables the Civil Engineering Division to investigate, find out if their perceptions are actually valid, and to ensure that steps are taken to correct the problem or meet the anticipated need. In this regard, the requirement of the Facilities Engineering Management Report establish a need for labor-hour data by major, minor, emergency, nonemergency, service, standing, scheduled and unscheduled work.

The Maintenance Management and Control system's Weekly Shop Labor Hours Compilation Log, Daily Work Order Labor Hours Tabulation and Weekly Labor Hours Talley Sheet provide the necessary input to those same categories.

e. Budget Justification Data for OG-30 Allotments

The Civil Engineering Division does not manage Obligation Guide 30 funds but it does make some input to the OG-30 budget process in hopes of ensuring that sufficient OG-30 funds are available for the unit's routine maintenance and repair needs. Accordingly, it needs information on total OG-30 maintenance expenditures and some information on the reasons for such expenditures (i.e., fuel, supplies, utilities, etc.). Again we find ourselves needing data by object code as is required by the Facilities Engineering Management Report, but which is specifically reported by neither the local financial accounting system nor the Maintenance Management and Control system.

f. Total Maintenance Dollar Value Expended By Unit

This information is reported as part of the annual Facilities Engineering Management Report. Its principle use is as a budgeting factor.

g. Information to Compare the Costs of Continuing a Function In House vs Contract

Covered under "Facilities Engineer Information Needs."

h. Information to Evaluate Whether a Large Maintenance/Betterment Project Proposal Should Be Approved

Two factors go into such a decision. Have maintenance costs presently being experienced exceeded the scope of routine, day-to-day upkeep and, will a need continue to be served by maintaining the structure in question?

The current system's failure to match costs with structures makes it nonresponsive to the first question. The second question was never designed to be answered by either the Financial Accounting or Maintenance Management and Control but instead must be answered by the facility's users.

i. Must Be Able to Identify the Impact of a Policy Decision Within One Year

Once a policy decision has been made, it is felt important to have evidence of the impact of such a decision particularly as far as the decision's dollar cost to the Civil Engineering program.

Because of the wide variety of policy decisions that can be made, it is impossible to tell whether the impact of any given decision will be reflected in the output of either the Financial or Maintenance Management systems. Having an annual report such as the Facilities Engineering Management Report, however, facilitates comparison between years and thus increases the probability that a decision's impact will be noted.

j. What Percentage of the Work Done by a Facilities Engineering Activity is Structural, Electrical, Mechanical, etc.?

One method of evaluating whether the unit is staffed with the proper skills is to match skills available against the percentage of effort that must be expended in that area.

The Maintenance Management and Control System partially facilitates such a comparison in that its Weekly Shop Labor Hours Compilation Log

collects and reports labor hours by shops that are fairly consistent with structural, mechanical, electrical trade breakdowns. The unit does not report work effort to Headquarters in accordance with these categories, however.

D. CONCLUSIONS, RECOMMENDATIONS AND PROBLEM AREAS

Among the problems with the current methods of accounting for Facilities Engineering Division resources are two which though by now may be quite apparent, certainly justify restatement.

1. While the Maintenance Management and Control System is designed to provide information to enable the Facilities Engineer to prepare the annual Facilities Engineering Management Information Report, much of the data for this report must come from other sources.

2. Although almost every level in Facilities Engineering management needs or could make use of a distribution of work order costs to structures, the system does not record or report in that fashion.

Other problem areas which require attention are:

1. A lack of adequate performance standards against which the data collected by the Maintenance Management and Control System can be balanced. Naval Facilities Engineering Command performance standards have been tried in this regard but seem not to be entirely consistent with the needs of the typical Coast Guard Public Works operation. As data continues to be collected by the Maintenance Management and Control System, perhaps more applicable performance standards can be developed.

2. The only overall look at the characteristics and performance of the Facilities Engineering Division is taken annually when the Facilities Engineering Management Information Report is prepared and submitted to Headquarters. Although a genuine problem in its own right, this condition is symptomatic of

a much larger and much more severe problem, that being a lack of time and clerical resources for local management to review and analyze the reports generated in conjunction with the Maintenance Management and Control System. While much of the information needed by the Facilities Engineer was provided or could be computed from data collected by one of the daily or weekly man hour/material tabulations, the fact that the Facilities Engineer expresses an inability to review and digest this information indicates that his information needs at least partially remain unsatisfied.

A possible solution to this problem might be the application of data processing to the Maintenance Management System. Every Coast Guard District maintains within its Comptroller Division a data processing section. As Support Center Portsmouth's Account 19 transactions are processed by the nearby Fifth Coast Guard District office, so might Training Center Alameda's Facilities Engineering Division utilize the data processing resources of the Twelfth Coast Guard District in San Francisco. This would involve the preparation and implementation of computer program which, using existing daily man hours and materials use inputs would prepare the necessary labor hour categorical summaries and distribute costs and hours to work orders. In this writer's opinion all of the current transactions, including partial preparation of the annual Facilities Engineering Management Information Report could be done relatively economically using as little as 500 lines of computer readable code.

Some redesign of the existing labor hour and material use source documents would be required but the benefits to accrue in terms of decreased clerical work load on shop supervisors and the unit's maintenance scheduler would justify the effort. Additionally, once the system was initially established, supplementary capabilities in the form of weekly management reports and analysis of collected data could probably be added.

VI. COAST GUARD HEADQUARTERS OFFICE OF ENGINEERING

A. BACKGROUND

As the level of management common to each of the in house maintenance activities and accounting/financial control systems discussed thus far, the Headquarters Office of Engineering has, as it's tasks, the coordination of the five separate Engineering Support Programs, the promulgation of policy relative to Engineering Support Programs and in house maintenance activities, and the acquisition of adequate levels of funding and manpower resources to ensure that Support Programs and Industrial Activities fulfill their missions. In discharging these responsibilities (particularly the last), the Office of Engineering is very much involved in the annual budget process and critically interested in developing sound justifications for those portions of the Coast Guard's budget that apply to Engineering Support. Accordingly, most of the information needs of this organization revolve around the budget and budget justification.

Information routinely received by the Office of Engineering includes the Coast Guard Yard's annual report, the Aviation Repair and Supply Center's Summary of Cost Report, and Support Center Portsmouth's Analysis of Work Order by Class of Unit, Comparison of Actual Costs with Industrial Budget and Analysis of Industrial Work Orders Reports. Other information must come from the Office's associated activities such as the Headquarters Engineering Support Managers, District Chiefs of Engineering, District Industrial Managers, District Engineering Support Manager or the field units themselves.

This chapter concludes the discussion of information needs vs information provided by industrial accounting systems with a look at the information needs

of the Office of Engineering attempting to ascertain how much of the information needed exists within the present network of industrial accounting/control systems and how much of the existing information is accessible.

B. INFORMATION REQUIRED VS ACCOUNTING/FINANCIAL CONTROL SYSTEMS

1. Unit Maintenance Costs by Class/Type of Unit and Type of Expenditure

This information need can probably best be illustrated by considering an example such as that posed by the Coast Guard's 378 class of high endurance cutters. We know with regard to this class of hardware that each ship absorbs about $24 million in direct operating costs annually.[1] To approximate total costs for budget purposes, we have in the past been adding thirty per cent of direct cost under the heading of "support." While this practice seemed adequate under the former incremental budgeting procedures, it is totally inadequate with respect to the current Zero Base Budgeting philosophy because the concept of "support" is vague and easily subordinated to more specifically articulated needs. In order to adequately provide for the support needs of any class of unit, whether it be a cutter, shore station or aircraft, we must be able to identify for each class of unit or hardware exact support costs in terms of line item of Engineering maintenance service. In other words we must be able to identify specifically what things go into the concept of support and identify, on the average, what each service item usually costs. Zero Base Budgeteers will accept no less.

While the systems studied are capable of providing part of the information required in this regard, and all of them probably collect enough

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[1]Telephone conversation, CDR R. E. Haas, Senior Staff assistant to the Chief of Engineering (CGHQ), 20 July, 16 August, 17 September 1979.

miscellaneous bits and pieces to provide the required data if a special effort were made, none of them aggregate it exactly as stated above. AR&SC for example can only provide repair data by class of aircraft by searching the Work Progress Reports manually, Support Center Portsmouth aggregates costs by type of unit but there is some question as to whether those aggregations are detailed enough, and Non-Industrial activities only report costs by individual unit, not type or class. In as much as Training Center Alameda is a single function command, all of its costs are reported by type of unit (Training Command) but that is only a reflection of the type of unit Alameda is, not of the features of its Maintenance Management and Control System.

As far as recording costs by type of service, only component repair data as collected at AR&SC and the major/minor, emergency/nonemergency, etc., breakdowns which are part of Training Center Alameda's system, approach meeting Headquarters' needs.

Although the capabilities mentioned above are not without merit, what really seems necessary for the Office of Engineering is the ability to produce such information as the typical cost of a high endurance cutter turbine overhaul, the average H-3 engine repair cost, the average cost to overhaul a 44 foot motor life boat or the average engineering maintenance expenditure aboard a two boat Search and Rescue Station. This is the type of information Congress may ask for during a budget hearing but it is not the type of information the previously studied accounting systems provide in any easily retrievable fashion.

2. <u>What is Happening to that Portion of OG-30 that is Programmed for Maintenance</u>?

As we have seen in the previous two chapters, Engineering Maintenance funds at some units come from OG-30 for routine expenditures and from the formal Engineering Support Obligation Guides for more involved work. As the reader

may remember from an earlier chapter, neither the Office of Engineering nor the Engineering Support Managers control OG-30 but do have an impact on the amount of OG-30 funds made available for maintenance purposes. They are interested, therefore, that the full amount of OG-30 earmarked for in house maintenance is actually used for maintenance. Were it being diverted for other purposes (which is the perogative of a Commanding Officer with respect to OG-30), the Office of Engineering might be inclined to press for more of the Coast Guard's Operations and Maintenance appropriations to be allocated directly to Engineering Support Obligation Guides, where tighter control of maintenance funding could be maintained, and less to OG-30. As such, the Office feels the need to be able to monitor the degree to which maintenance earmarked OG-30 is actually used for maintenance.

This question only impacts in two areas covered by this paper, Non-Industrial activities and the Facilities Engineering Division of Training Center Alameda. With regard to Non-Industrial activities only the unit's memorandum Point Account and Work Order records would provide positive evidence of the actual amount of OG-30 funding made available for in house maintenance. While the District Industrial Manager, the District Chief of Engineering or possibly one of the District Engineering Support Managers may have knowledge of the current amount of OG-30 funding available for in house maintenance, the Chargeback system's mechanics do not require that this be so. At any rate, while the information is probably accessible, it is remote from the Office of Engineering.

In the case of Training Center Alameda, OG-30 expenditure levels are available both from the unit's financial accounting system (which the Office

of Engineering probably could gain access to) and from the Annual Facilities Engineering Management Report which is held by Headquarters Civil Engineering Division.

Where the real problem lies, however, is that a substantial amount of OG-30 funding available for maintenance is handled not by industrial type activities but by standard field units where there is no requirement for an accounting system which identifies level of maintenance effort. As a result, identifying the total dollar value of Engineering Maintenance Support absorbed by one of these units is extremely difficult.

3. Specific Information on the Yard and AR&SC

Because the Yard and AR&SC are the Coast Guard's two largest industrial units they are of specific interest to the Office of Engineering and to the Federal watchdog agencies (GAO, OMB, Congress) to whom the Coast Guard must justify its need for such capacity. Specifically required to satisfy these interests groups is information on work load, the premium (if any) the Coast Guard pays for Yard and AR&SC operation, and the quality of the product.

As this paper has not examined the Coast Guard Yard's cost accounting/financial control systems, it will not attempt to do so now. It will, however, consider the three areas above with respect to AR&SC.

a. Work Load

As the reader may remember from Chapter II, annual work load is negotiated between AR&SC and the Aeronautical Engineering Division of Coast Guard Headquarters. It is, therefore, readily available to the Office of Engineering.

b. Premium Paid for Operation

Whether there is a premium paid to operate AR&SC or not is determined by examining the cost of the unit's products (overhauls and repairs)

against the same work performed by private contractors. As the reader again is asked to remember, the Summary of Cost Report makes this comparison for general component categories while the Work Progress Report provides at least the basic data an analyst could use to compute the modal overhaul cost for major classes of aircraft. Both reports are available to the Aeronautical Engineering Division and also, therefore, to the Headquarters Office of Engineering.

c. Quality of Work

Quality of work, of course, is something that is infrequently evidenced by any accounting or financial control system. Instead, it is reflected in the comments of those who use the unit's product, and in the case of aircraft, indirectly through the trends in Non Operationally Ready (NORS Reports received by the Aeronautical Engineering Division).

4. Manpower Utilization Data

A frequently asked question by budgeteers and others interested in review of Coast Guard Industrial programs is what percentage of available work hours is the industrial labor force directly engaged in performing productive industrial tasks and what are they doing the remainder of the time.

This information is provided for AR&SC via those portions of its [illegible] Progress Report which provide man hour totals for direct and indirect [illegible] and break indirect work into one of twenty categories such as sick leave, [illegible] training, injury time and labor-management negotiations. It of [illegible] available to the Headquarters Aeronautical Division and thus is [illegible] Office of Engineering.

[illegible] Portsmouth the Comparison of Actual Costs with [illegible] provides totals for both productive and nonproductive [illegible] breakdowns provided by supervision, leave and holidays

and idle/nonproductive categories. As the reader may recall, this report is one of three external reports made available to Headquarters, being received by the Office of Engineering's own Management and Industrial staff.

Training Center Alameda's Maintenance Management and Control System Daily Work Record logs both total productive and nonproductive time aggregating nonproductive time into training, leave, administrative and unauthorized categories. It does not, however, report the information in those categories beyond that point. Instead, it totals man hours from three of the four categories above into a single "Authorized Nonproductive Man Hour" figure which is reported to Headquarters Civil Engineering Division as part of the Annual Facilities Engineering Management Report.

The Non-Industrial Chargeback system does not differentiate between productive and nonproductive time.

5. Maintenance Cost Per Productive Labor Hours

As reported in an earlier chapter, management has a need for an index to enable it to guage efficiency and performance trends for industrial activities who's specific missions and operating conditions vary widely. Such an index is needed not only to enable the comparison of facilities with each other but with those who offer similar capabilities in the private sector. Further, it would be useful in comparing the performance of industrial facilities with prior periods. The single index which is frequently used at the operating level, Districts and at headquarters is total industrial cost per productive labor hour.

While none of the accounting/control systems studied specifically reports this index, it is easily computed under most conditions. Direct labor hours and total industrial costs are reported as part of AR&SC's Work Progress Report. Total industrial costs are a feature of each of the reports Support

Center Portsmouth makes available to Headquarters while the Support Center's Base Management Report (available to District) provides a listing of total work order hours. The Non-Industrial system's Monthly Work Order Log lists productive hours and approximates full industrial costs by adding material costs to its standard labor/overhead charge, and Training Center Alameda's Facilities Engineering Management Report collects man hours, salaries (including overhead) and materials costs.

6. What is the Best Use of Industrial Resources

With budgeting decisions comes the question of where the primary funding emphasis should be. Given constrained resources, should funding priority be placed on shipboard maintenance, on the shore plant, in maintaining aids to navigation, on electronics or on aircraft.

This, of course, is not an accounting/financial control question. Instead, it is a matter for the subjective consideration of Headquarters policy makers, not only in Engineering but in the operational programs Engineering programs support.

C. CONCLUSIONS, RECOMMENDATIONS AND PROBLEM AREAS

While it can be seen that many of the information needs of the Office of Engineering are met with data collected and reported by the accounting systems studied, it is apparent that there are two deficiencies that limit the information usefulness. First, the information is not always readily available. While reports routinely made available to the Headquarters Engineering Support Manager probably can be assumed to be accessible, data reported no higher than Districts or held only at the servicing unit itself is certainly not accessible on a timely basis nor can it be made available without special effort. Secondly, even information directly available is seldom reported in a common format. The

multiple aggregations of indirect/nonproductive labor time reported earlier in this chapter are illustrations of that condition.

Although these deficiencies seem of the type that could be remedied, the present responsiveness of the various systems to the Office of Engineering's needs must be questioned.

VII. CONCLUSIONS AND RECOMMENDATIONS

Because previous chapters have offered specific evaluative comments and conclusions with regard to the four industrial environments discussed thus far, this chapter will avoid repeating or enlarging upon those specifics. Instead, an across the board look will be taken in an effort to achieve the following purposes:

a. Recapitulate the results of this thesis' findings regarding the responsiveness to management information needs of the various Accounting/Control systems studied.

b. Highlight several key information categories found to be common to each of the four in house maintenance environments.

c. Outline several of the problem areas or deficiencies found to be common to each of the systems.

Additionally, a few brief recommendations will be made with respect to Industrial/in house maintenance and accounting control overall, and three suggestions for future research effort will be discussed.

A. RESPONSIVENESS OF INDUSTRIAL ACCOUNTING/CONTROL SYSTEMS TO MANAGEMENT INFORMATION NEEDS - A RECAPITULATION

If the reader will reflect for a moment on the preceding chapters, he will undoubtedly agree that the question of whether or not a given information need is responded to by the cognizant Industrial Accounting/Financial Control System is not a yes/no issue. Instead, we have seen that the satisfaction of individual information needs is a matter of degree which falls into one of the following categories:

a. Information needs which the system(s) fully meets. The information is responded to by some portion of a regularly prepared management report.

b. Information needs which are partially met. An example of such a need is that expressed by the Headquarters Aeronautical Engineering Division for cost per flight hour data where the AR&SC cost accounting system collects only a portion of the total aircraft maintenance and operating costs which would go into a cost per flight hour computation.

c. Information needs which are met by an Accounting/Control System but only after extensive manual searching and aggregation of work order data, or data regularly reported only at lower management levels.

d. Information needs which are met by formal or memorandum financial accounting records. Status of funds information is an example here.

e. Information needs which are not met and which an accounting system should not be expected to meet. Information relating to customer satisfaction or product quality are two such items.

f. Information needs which are not met even though an industrial accounting/control device could do so. This does not necessarily require that the manager is acting without the required information, only that the information needed is not provided by one of the accounting/control systems that impact upon the industrial activity with which he is concerned.

1. Responsiveness Overall

The possible information need responses noted above together with the number of times each occurred during the course of this study are tabulated for the four industrial environments examined, and for the Headquarters Office of Engineering as Exhibit 7-1.

As the reader will note, it appears that the dual Cost Accounting/ Production Control Systems in operation at AR&SC Elizabeth City are the most directly responsive to management information requirements, fully meeting information needs 33 per cent of the time. Also, AR&SC's systems seem most

INFORMATION REQUIRED VS INFORMATION PROVIDED

	AR&SC		Portsmouth		Non Industrial		Alameda		Headquarters Office of Engineering	
	#	%	#	%	#	%	#	%	#	%
Total Number of Information Needs	43	100	43	100	24	100	26	100	9	100
Number of Information Needs That System(s) Meet Fully	14	33	10	23	5	21	5	19	1	11
Number of Information Needs That System(s) Meet Partially	7	16	14	33	5	21	5	19	3	33
Number of Information Needs Met With Extensive Manual Searching of Records	8	19	4	9	7	29	4	15	3	33
Number of Information Needs Met by Financial Methods	1	2	0	0	1	4	2	8	0	0
Number of Information Needs Not Met and Not Intended To	9	21	7	16	1	4	2	8	1	11
Number of Information Needs Not Met (System Failure)	4	9	8	19	5	21	8	30	1	11

Exhibit 7-1

advantageous in that their outright failure to respond to an information need is lowest of those studied at only 9 per cent while Training Center Alameda seems to have the highest failure rate, failing to provide required information 30 per cent of the time.

Possibly a more significant indicator of overall success in information collection and dissemination are those categories which indicate either a partial fulfillment of management requirements or fulfillment only with an extensive manual search effort. As the exhibit shows, Headquarters Office of Engineering seems to be in the least satisfactory position in this regard with 33 per cent of its needs partially met and another 33 per cent met only with extreme search and retrieval effort. Non-Industrial activities, Support Center Portsmouth, AR&SC and Training Center Alameda are in similar condition with 50, 42, 35 and 34 per cent (respectively) of the information needs expressed being in the partially met/manual search categories.

What information needs falling into these two categories would seem to indicate is that with system improvements, the four systems studied would be capable of providing much more in the way of needed management information. In the case of AR&SC for example, addition of those information needs now met only with extensive manual search effort would increase the full success rate of the Cost Accounting/Production Control Systems from 33 to 52 per cent.

2. Local vs District/Headquarters Management Level Comparison

A second method of looking at the relative success of the various systems is to compare responsiveness on a local vs higher level management basis to determine roughly which group of managers benefits most (or least).

Accordingly, data tabulated in Exhibit 7-1 was broken into local management and District/Headquarters level management formats as is presented in Exhibits 7-2 and 7-3.[1]

Looking at the local management situation first, we see that AR&SC's systems again are the most directly responsive to management information needs with 33 per cent of the stated needs being met fully while only 12 per cent are not being met at all. Non-Industrial systems are reasonably close behind with 27 per cent success and 13 per cent failure, while Portsmouth's Account 19 and Alameda's Maintenance Management and Control Systems are least directly responsive with each fully meeting only 17 per cent of management's needs, and failing 21 and 22 per cent of the time, respectively.

With respect to higher level management, AR&SC again is high at 39 per cent success but Alameda with 36 per cent and Portsmouth with 33 per cent success are close behind. Non-Industrial systems on the other hand seem to do the poorest job, meeting District/Headquarters information needs fully only 6 per cent of the time and failing entirely to meet 47 per cent of the stated information needs.

In a comparative sense it is believed that the following conclusions can be reached:

a. AR&SC Cost Accounting and Production Control Systems are strongest of the systems studied. There is significant room for improvement, particularly in view of the rather high percentage of needs that are partially met or met only with extensive manual effort.

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[1]Data tabulated in Exhibits 7-2 and 7-3 are not additive (i.e., they do not total to values given in Exhibit 7-1) because information needs common to both local and higher level management are noted only once in Exhibit 7-1.

INFORMATION REQUIRED VS INFORMATION PROVIDED(LOCAL MANAGEMENT)

	AR&SC		Portsmouth		NonIndustrial		Alameda	
	#	%	#	%	#	%	#	%
Total Number of Information Needs	33	100	29	100	15	100	18	100
Number of Information Needs That System(s) Meet Fully	11	33	5	17	4	27	3	17
Number of Information Needs That System(s) Meet Partially	5	15	8	28	3	20	4	22
Number of Information Needs That System(s) Meet With Extensive Manual Search of Records	5	15	3	10	5	33	4	22
Number of Information Needs Met By Financial Methods	1	3	0	0	1	7	2	6
Number of Information Needs Not Met and Not Intended To	7	21	7	24	0	0	2	11
Number of Information Needs Not Met (System Failure)	4	12	6	21	2	13	4	22

Exhibit 7-2

INFORMATION REQUIRED VS INFORMATION PROVIDED
(DISTRICTS, HEADQUARTERS)

	AR&SC		Portsmouth		NonIndustrial		Alameda	
	#	%	#	%	#	%	#	%
Total Number of Information Needs	18	100	24	100	17	100	14	100
Numbdr of Information Needs That System(s) Meet Fully	7	39	8	33	1	6	5	36
Number of Information Needs That System(s) Meet Partially	2	11	9	38	2	12	3	21
Number of Information Needs That System(s) Meet With Extensive Manual Effort	4	22	3	13	4	24	0	0
Number of Information Needs Met By Financial Methods	0	0	0	0	0	0	0	0
Number of Information Needs Not Met and Not Intended To	4	22	1	4	2	12	1	7
Number of Information Needs Not Met (System Failure)	1	6	3	13	8	47	5	36

Exhibit 7-3

b. In its present form, Portsmouth's Account 19 system is relatively weak in meeting local needs but quite competitive with other systems in providing for the information needs of the higher management levels. The locally oriented improvement plans discussed at the end of Chapter III would seem to be consistent with this situation. It is this writer's opinion that should the increased data processing involvements and technical improvements presently planned become a reality, Support Center Portsmouth's system will take on a much stronger responsive position.

c. Clearly, the Non-Industrial Chargeback system's strength is its support of the information needs of local management. As discussed in Chapter IV, this seems consistent with the system's design. On the other hand, the system's weakness is in response to the needs of higher level management. It appears that when Account 19 was exchanged for the Chargeback system, a great deal may have been sacrificed.

d. Training Center Alameda's Maintenance Management and Control System seems neutral with respect to higher management level information needs. As reference to Exhibit 7-3 shows, the system meets management information needs fully and fails completely the same percentage of the time. Further, as will be recalled from Exhibit 7-2, the system is notoriously weak at meeting local management's needs. On the positive side, the system seems to have a great deal of higher management level attention which should improve its prospects for greater responsiveness in the future. Whether the system becomes more responsive to local needs hinges largely on the increased availability of clerical and/or data processing support.

B. COMMON INFORMATION NEEDS

The issue of common information needs is covered here to complete an earlier discussion regarding the possible implementation of a single Coast

Guard Accounting System. The question which arose when this possibility was originally introduced involved whether such a system would be designed with a view toward making it a viable day-to-day management tool or whether it would simply become a historical-fiduciary device. If the latter is to be avoided, it is obvious that management information needs such as those expressed in this paper must be considered. The difficulty for an accounting system designer, as the preceding chapters have shown, is that the number of distinctive information needs is enormous (over 100) and many needs are peculiar to the affected unit's products or organizational relationships.

Despite this apparent diversity, it is this writer's opinion that most of the information needs expressed do fall into one of four key categories which system designers can, and must respond to. They are as follows:

1. We must be able to identify what types of units, what classes of hardware and what physical structures we are supporting. We need to know specifically how much maintenance effort is going into each of these beneficiary classifications and what type services each is receiving.

Unless this information is available, in house maintenance managers cannot hope to be able to make a sound case for resource needs nor can they intelligently allocate those resources which are available for the greatest benefit of the service.

2. We must be able to determine the true costs of our "products." This need requires the availability of valid, comparative cost information for each significant service classification. Such information would enable senior management to attack strategic questions regarding what maintenance services the Coast Guard should or is best suited to provide for itself (e.g., A-76 type reviews). On a more short term plane true cost data is required to

insure that we are not employing our in house resources in areas where it would be less costly to use contract services. This is a significant danger under those systems where there is no customer/vendor relationship or where a significant cost component (i.e., labor or overhead) is not costed to work orders.

It is clear that what true cost means is full cost data. Materials costs or even materials plus labor are not sufficient. Instead, a determination of true industrial cost requires inclusion of materials, labor, labor fringe benefits plus a fair portion of those costs (utilities, supervision, clerical services, physical plant amortization, etc.) we aggregate under the heading of overhead.

3. We must be in a position to identify and respond to problem areas within the organization. Specifically, which shops, which trades, which individuals and which jobs require management's individual attention.

4. We must know how much funding authority was originally available, how much we have obligated or expended, how much we have remaining and what kind of items expenditures were made for.

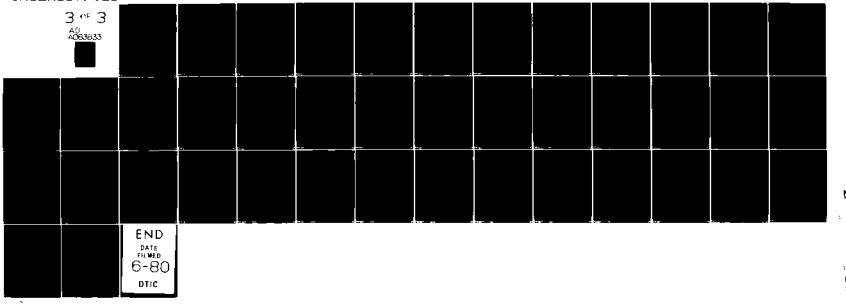
C. COMMON PROBLEM AREAS

As there are areas of common information concern, so too are there problems common to each of the systems studied. Among them are:

1. Delays in receiving information collected by the system. The problem was most clearly disclosed in the discussion of AR&SC's Summary Analysis of Cost Report, in the inability of Account 19 to provide needed daily updates, and in what amounts to no more than a once per year overview provided by Training Center Alameda's Maintenance Management and Control System.

AD-A083 633 NAVAL POSTGRADUATE SCHOOL MONTEREY CA F/G 5/1
CONTRAST BETWEEN MANAGEMENT INFORMATION NEEDS AND INFORMATION P--ETC(U)
DEC 79 R D RECK

UNCLASSIFIED NL



What must be remembered is that management is a daily activity and that not all management decisions can be delayed to the future. Information which is not available in a timely fashion to facilitate decision making is hardly worth the collection effort.

2. Information collected is not always reported in a useable format. The rather significant percentage of information needs satisfied only by extensive manual search effort, as reported in Exhibits 7-1 through 7-3, is indicative of this problem. Again, systems which fail to report what they collect in a form management can use without extensive additional effort are of questionable value.

3. There is a lack of suitable performance standards against which industrail effort can be guaged and compared. To a large degree this is due to the nonstandard, emergency or remote character of much of the maintenance work performed. There seems to be sufficient numbers of homogeneously performed task operations or task subdivisions to justify development and utilization of man hour and/or cost standards.

4. The Coast Guard does not know for sure where its support effort is going. It seems that none of our industrial accounting/control mechanisms fully appraises Maintenance Activity Management of what structures, what hardware and what Coast Guard programs its resources are supporting, nor is management sure of the total dollar level at which support is being rendered.

D. RECOMMENDATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

1. Assessment

In part, the ability of the Coast Guard to provide adequate engineering support services in the future rests with the success of its accounting and control systems. As the Commandant recently pointed out in a presentation to

the Secretary of Transportation, new programs and responsibilities have severely taxed the physical plant while at the same time age and changing operating conditions have made much of the service's plant and equipment technologically and functionally obsolete.

Regrettably, however, there has never been a worse time in government fiscal history to request such additional engineering support resources as would be needed to put the Coast Guard's physical plant and operational hardware in satisfactory condition. As one interviewee put it, the real amount of the Federal Government's budget is fixed. The only way the Coast Guard can hope to get an increase is to gain at someone else's expense and this requires making stronger, more irrefutable arguments. In order to make such arguments, what is required is sound, detailed financial and resource management information, some of which existing industrial accounting/control systems now partially provide. They could provide much more in the future with systems improvements. The principle difficulty in generating, recording and reporting this information is that it will put an added strain at the local level on already inadequate clerical resources.

The most logical solution to this dilemma is to accelerate the move toward automating existing systems through use of presently existing computer facilities, as Support Center Portsmouth is doing, or through introduction within maintenance facilities of minicomputers. As some managers are already finding out, electronic data processing capability may offer the potential to vastly increase the amount of information that can be collected and processed without appreciably increasing the size of the clerical staff. The interested

reader is referred to CDR Walter Reisig's work in this area with respect to automated information handling in the Facilities Engineering Environment.[2]

2. Suggestion for Future Research

The information concerns, problems and recommendations discussed above lead to three areas of recommended future research. They are:

a. Examine possibilities regarding automation of Training Center Alameda's Maintenance Management and Control System. The researcher in such a project would attempt to design a system using data processing equipment presently available through agreement with the Twelfth Coast Guard District in San Francisco. The system designed would be required to involve no increase in clerical personnel or paper flow as opposed to the existing system. Such a project would test the feasibility of and highlight problem areas which could arise in attempting to interface Electronic Data Processing with accounting/control systems in small maintenance activity environments.

b. Identify tasks, task subdivisions or operations where man hour or cost performance standards can be established. This project would seek to reinforce or disprove the contention made in this paper that standard times or costs could be promulgated for such routine activities as buoy sandblasting/painting, diesel engine rebuilding, aircraft component overhaul or certain preventive maintenance tasks. Further, it would examine whether such standards could be used beneficially in monitoring performance, highlighting problem areas or improving production technique.

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[2]Commanding Officer, USCG Training Center Cape May, New Jersey, letter 5233, 22 March 1978. Subject: Automated Facilities Engineering Maintenance Management System.

c. Examine the actual reduction in clerical effort and cost (if any) that resulted from elimination of Account 19 and the institution of Chargeback accounting at small multifunctional engineering support activities. This project considers the possibility that a significant loss of District and Headquarters management information resulted from the elimination of Account 19 and that in some Districts this information loss required the supplementing of Chargeback with additional reports beyond those intended by the Commandant. A hypothesis in this case would be that the Chargeback system has had no benefit, only cost in terms of reduced information flow.

3. Concluding Comments

This paper has been written on the premise that accounting and financial control systems utilized by in house maintenance activities should respond to management's information needs and be designed to present information in a way management finds most useful. The assumption inherent in such a purpose is that management information needs can indeed be identified. With such an assumption comes at least two risks. They are:

a. That one really cannot be sure all the information the user needs and wants has been identified. With respect to this project, on site interviews were conducted with a view toward isolating information requirements and initial impressions which were the product of these discussions were thought to have been validated by follow up interviews conducted with managers in similar positions. The fact remains, however, that what an interviewee will say and what his personal decision model demands may be significantly different.

b. That the stated information needs are limited to the character and format of information now available. The manager finds it impossible to articulate his needs or even recognize that he has a given information need because his thought process is clouded by his exclusive exposure to the existing system.

While this paper's comments should be judged with these risks in mind, it is felt that the precautions taken have successfully mitigated against them. As such, a reasonably accurate appraisal of the information needs of in house maintenance facility managers has been arrived at and the degree to which these needs are met by existing accounting/control systems has been determined.

APPENDIX A

INTERVIEW QUESTIONS

A. OPERATING MANAGERS (INDUSTRIAL MANAGER, PWO, REPAIR DIVISION BRANCH CHIEF, ETC.)

1. Starter Question

Suppose we decided tomorrow to eliminate all record keeping with regard to material, labor, etc., all attempts to isolate what an individual job costs and all requirements for reports to higher or outside authority. How would that affect your ability to wisely manage physical resources, people and funds entrusted to you? What action would you recommend?

Purpose of question: An attempt to find out what financial information the manager thinks is critical, what he thinks is absolutely necessary for management.

2. Categorical Questions

a. Resource Management

(1) Suppose you have a budget for a particular job of X dollars. Are you more interested in whether actual costs are less than or equal to $X or are you interested in the components of actual cost (e.g., labor vs the budgeted labor estimates, materials vs budgeted materials estimates, etc.)? Why?

Purpose of question: To get an idea of the degree of detail the manager needs or wants in budget submissions or other financial reports.

(2) How do you decide whether a job should, or could be contracted out? Does past financial data help you make that kind of decision?

Purpose of question: Does the manager use or would he use accounting/financial quantitative data to make the make/buy decision?

(3) What information do you use to determine labor efficiency, material use efficiency? Is that information important to you? Why?

Purpose of question: To determine the need or desire for variance analysis or in the absence of variance analysis, that which is used to determine labor/material efficiency.

(4) What information do you use to determine the performance of a particular department or work group?

Purpose of question: Same as number three.

(5) What is your reaction to this statement: Coast Guard owned facilities are always more expensive. The reason is that they are so inefficient.

Purpose of question: To determine if there is a need to justify the existence of the industrial function and, if so, what information is needed or available to do that.

(6) If faced with a civilian employee RIF, how would you recommend who to RIF? Would you do it by individual, by shop function?

Purpose of question: To determine if the manager can or needs to analyze if some function can be done more economically by outside contract vice continuing the function in house.

(7) How is work prioritized?

Purpose of question: The pricing mechanism is used to prioritize work in some activities to determine if such application would be useful. If so, is sufficient data available to establish an accurate pricing mechanism?

b. Budgeting - Estimating

(1) What information do you use to make up your budget? What is the procedure for figuring your needs?

Purpose of question: To determine components of budget justification for later comparison vs information provided by accounting system.

(2) Do you keep track of how a:

- key job phase is progressing vs the budget?
- work order in total is doing vs the budget?
- the overall maintenance organization is doing vs the budget?

Purpose of question: To determine level of detail required and frequency with which the managers review job progress. What internal reporting does he need?

(3) Do you do your own work order estimates or do estimates come as a given from some other organization?

Purpose of question: To determine if past data is used or would be used for future cost estimating. If so, is that data retrievable, how easily?

c. Fiscal Control

(1) How do you find out when a function, department, a particular job or one of your supervisors is having problems that require more of your immediate attention?

Purpose of question: To determine if the manager has a need for the accounting system or any other control system to produce flags to indicate a need for his attention in some area.

(2) Do you need to check from time to time regarding whether funds are being spent for the purpose they were intended (e.g., that a deficiency in one work order is not being made up with funds from another or that unauthorized projects/expenditures are not being made)?

Purpose of question: Transfer of costs to work orders that are "fat" has been a problem in industrial environments for some time. Its adverse

affect is on the ability to tell exactly what specific jobs cost. Is it a problem; how do they prevent it? Are features needed to prevent it? Is prevention of this type of action desired; why?

(3) How do you make sure clerical people (e.g., accountants, bookkeepers) and the clerical system itself is giving you good, reliable information?

Purpose of question: To determine what level of accuracy the manager needs and is he getting it.

(4) How quickly do you need to see the results of a funds expenditure? (How fast do you need feedback?)

Purpose of question: How fast must the accounting/control system report to the manager? Does it report that fast?

(5) Is your stewardship of the funds ever audited? By whom, how often?

Purpose of question: Again, to determine accuracy and completeness requirements.

(6) How well do you understand the financial data you receive?

Purpose of question: To determine the manager's ability or desire to review detailed financial data. To determine level of aggregation required or desired. Is there too much information in the reports or too little?

(7) How should financial data be presented so that it is of most use to you?

Purpose of question: Follow up to preceding question. If presentations do not meet the manager's needs, how should it be changed?

d. External Reporting

(1) What higher authorities do you report to, in what form, how often?

Purpose of question: Self-explanatory.

(2) Do you use reports to make a case for: (a) more money, (b) more people, (c) other needs?

Purpose of question: To determine how important the manager thinks the financial reports are. What things would he like to see presented in them and what would he like to see them communicate?

(3) Do you think these reports have a bearing on the evaluation others make of you, your maintenance organization?

Purpose of question: What does the manager fear the reports do or don't indicate? Does he want to show a certain percentage of overhead, for example, to be judged efficient by his superiors?

e. Pricing

(1) Do you charge the: customer, program, hardware type, other?

Purpose of question: Self-explanatory.

(2) How do you know what is a valid and fair amount to charge for the task?

Purpose of question: To determine the accuracy requirement for cost assignments.

(3) What purpose do you think charging or allocating costs to customers, programs, hardware types, etc., serves?

Purpose of question: To determine what purpose the cost assignment serves. How does the manager use that data? How do higher levels use it? There are other purposes for cost assignment beside billing; what are they?

(4) Is there anything you are required to figure in a price or charge that you think should not be there?

Purpose of question: Follow up on the previous two questions.

f. Program/Mission Analysis

(1) What recommendations do you make relative to the scope of work your unit should be undertaking (e.g., what tasks you could do vice contract, could you do more, is your workload too great)?

Purpose of question: Some tasks government activities can do well, some they may be very inefficient at. Does the manager have a desire to weed out those capabilities that are not cost effective? How does the existing financial information system help him do that?

(2) Are there any capabilities/capacities you have now that you could do without? Are there capabilities you do not have but think you need?

Purpose of question: How would the command go about justifying additional capacities and capabilities? Does it need to do that? What readily available data could help them do that?

(3) How do you tell what units are benefiting the most?

Purpose of question: To determine if there is a need to tell who or what types of units are beenfiting from the users services. What does the manager need that information for? How does he use it?

g. General

(1) In a few words, what is the purpose of financial control/ accounting systems? What do you expect them to do for you?

Purpose of question: Another attempt to get at what the manager sees as critical information.

(2) What financial information do you not now have but could use?

Purpose of question: Self-explanatory.

B. FACILITY COMMAND QUESTIONS

1. Starter Question

Suppose we decided tomorrow to eliminate all record keeping with regard to material, labor, etc., all attempts to isolate what an individual job costs and all requirements for reports to higher or outside authority. How would that affect your ability to wisely manage physical resources, people, and funds entrusted to you? What action would you recommend?

2. Categorical Questions

a. Budgeting

(1) What directives do you give to Department Heads/Division Officers with regard to budgeting?

(2) Generally, what budget related information do you want to see?

(a) Just bottom line figures?

(b) General functional/categorical backup (information on departments, general labor, general materials)?

(c) Detail nitty-gritty (information by department, industrial laborer, components of w/o estimate)?

(3) How do you know the budget data you get is "good" (accurate, reliable, realistic)?

(4) Once you have an operating budget, how do you use it?

b. Resource Management

(1) Suppose you have a work order for $X. Are you more interested in whether the w/o comes in under budget or the components of the w/o estimates are met (i.e., labor vs budget, materials vs budget)?

(2) How do you know when the (PWO, Industrial Manager, etc.) is utilizing his resources effectively and making the required contribution to the mission of the command?

(3) Are you concerned whether something should be contracted out or done "in house?" What criteria would you use to decide?

(4) What information do you use to guage efficiency of the resources assigned to you?

(5) Do you have any idea of the percentage of or dollar value of assets assigned to the maintenance function?

(6) What is your reaction to this statement: Coast Guard owned facilities are more expensive than commercial. The reason is they are so inefficient.

(7) How do you prioritize the maintenance work that is done?

c. Fiscal Control

(1) How do you find out when a particular project, department or supervisor is having problems that require your individual attention?

(2) How do you know that funds are being expended for the purpose they were intended?

(3) How should financial data be presented so that it is of the most use to you?

(4) Are you satisfied that financial information presented to you is accurate? Can you feel confident making a decision on the basis of it?

(5) How quickly do you need to see the financial impact of some decisions?

(6) How well do you understand the financial data you receive?

d. External Reporting

(1) How do you see the role of external reports:

(a) To get more money?

(b) To get more people?

(c) Articulate other needs?

(2) Do you think external reports have a bearing on the evaluation others make of you?

e. Pricing

(1) What value do you see in assigning costs to benefiting units, programs, hardware type, etc.?

(2) Is there anything figured into a price that you think should not be there?

(3) Should price (cost assignments) be limited to units outside the servicing unit's command structure (e.g., should a support center who doubles as a group command only charge nongroup units)?

f. Mission Analysis

(1) Do you have "in house" capabilities now that you think you could do without? Do you lack capabilities you would like to have? How could you justify your contention?

(2) What kind of work do you think your "in house" capability should be undertaking?

(3) Are you interested in which functions, departments, subunits, stations or customers are benefiting the most from your "in house" capability? How can you tell?

g. General

(1) Do you make decisions on the basis of financial information?

(2) What is the purpose of financial control/accounting systems? What do you expect them to do for you?

(3) What financial information do you not now have but could use?

(4) Are there more financial considerations than (a) budgeting, (b) control, (c) external reporting, (d) pricing - assignment of costs, (e) resource management, (f) mission analysis?

h. FM Background

(1) Degree of financial management education or work experience.

(2) Do you think you really understand the system you work under?

C. EXTERNAL COMMAND (DISTRICT, HEADQUARTERS, ETC.) QUESTIONS

1. Starter Question

Suppose we decided tomorrow to eliminate all record keeping with regard to material, labor, etc., all attempts to isolate what an individual job costs and all requirements for reports to higher or outside authority. How would that affect your ability to wisely manage your physical resources, people and funds entrusted to you? What action would you recommend?

2. Categorical Questions

a. Budgeting

(1) What direction do you give to subordinate commands, unit personnel, engineering servicing units, etc., with regard to budgeting?

(2) What degree of detail do you want to see in budget presentations to you?

(a) Bottom line figures?

(b) Bottom line with reasonable backup (e.g., work load on servicing units, amount of labor costs expected, materials costs data, etc.) ?

(c) Detailed justification (individual work orders or job to be accomplished)?

(3) How do you know that the budget data you receive is accurate, reliable, realistic?

(4) Once you have budget data, how do you use it?

(5) Is the OG-43 Algorithm an accurate estimator of District OG-43 needs?

b. Resource Management

(1) Are you more interested in whether servicing units under you are operating within budgets or whether such factors as labor estiamtes vs actual or materials estimate vs actual are correct?

(2) How do you know when the District (or servicing unit) under you is utilizing its resources effectively and making the required contributions to engineering support? Do you feel that you have a need to know?

(3) At your level, are you concerned whether something should be done "in house" or contracted out? What criteria do you use to decide?

(4) How do you guage efficiency in the use of resources you are (even remotely) responsible for?

(5) What is your reaction to this statement: Coast Guard in house facilities are always more expensive because they are so inefficient.

c. Fiscal Control

(1) How do you know when a particular unit (or district) is having problems which require your individual attention?

(2) How should financial data be presented so that it is of most use to you?

(3) Are you satisfied that financial information presented to you is accurate?

(4) How quickly do you need to see the actual financial impact of some decisions?

(5) How well do you understand the financial data you receive?

d. External Reports

(1) How do you see the role of external financial reports:

(a) To get more money?

(b) To get more people?

(c) To articulate other needs?

(2) Does financial data that comes across your desk have a bearing on the evaluations you make of subordinates?

e. Pricing

(1) What value do you see in assigning costs to benefiting units, programs, hardware type, etc.?

(2) Is there anything figured into a price or cost estimate you think should not be there?

(3) Should price/cost assignments be limited to units outside the command structure of the servicing unit? Why? (e.g., should "price" be limited solely for a group's servicing of a nongroup unit?)

(4) Assignment of costs to structures.

f. Mission Analysis

(1) Do we have "in house" capabilities we don't need or lack capabilities we do need? How could you prove your contention?

(2) What kinds of work should "in house" capability be undertaking?

g. General

(1) What do you see as the purpose of financial control/accounting systems in the Coast Guard? What do you expect them to do for you?

(2) What financial information do you not now have but think you could use?

(3) Are there greater (more) financial considerations than (a) budgeting, (b) control, (c) external reporting, (d) pricing - assignment costs, (e) resource management, (f) mission analysis?

(4) Do you make decisions partly or wholly on the basis of financial information?

APPENDIX B

LIST OF COAST GUARD MANAGERS INTERVIEWED

NAME	POSITION
CDR J. Corcoran	Commandant (G-EAE-2) Aeronautical Engineering Division, Fixed Wing Branch
CDR R. E. Haas	Senior Staff Assistant to the Chief USCG Headquarters Office of Engineering
Mr. Bob Clarkson	Chief, Accounting Branch, Ninth Coast Guard District, Cleveland, Ohio
CAPT J. G. Stanley	Chief, USCG Headquarters Civil Engineering Division
Mr. Norm Cossaboom	Asst. Financial Manager, USCG AR&SC Elizabeth City, North Carolina
Mr. George Lowe	Deputy Comptroller, Eighth Coast Guard District, New Orleans, Louisiana
LCDR Rich Keig	Industrial Manager, USCG Support Center Boston, Massachusetts
Mr. Alexander Ulreich	Chief, Management Services Staff, USCG Headquarters (G-CMA-5)
Mr. Jim Frezelle	Deputy Comptroller, Fifth Coast Guard District, Portsmouth, Virginia
CAPT G. F. Vivieros	Chief, Engineering Division, Third Coast Guard District, New York, New York
LCDR John Klemn	Executive Officer, USCG Base Mobile, Alabama
Mr. Ray Thompson	USCG Headquarters (G-FP), Former Chief Auditor of the Coast Guard
CDR Harry Reed	USCG Training Center Alameda, California Facilities Engineering Division Officer
CDR J. M. Bowen	Acting Commanding Officer, USCG Training Center, Alameda, California
CDR Thomas Daily	Chief, Civil Engineering Branch, Third Coast Guard District, New York, New York

Mr. C. E. Love	Asst. Chief, Civil Engineering Branch, Eighth Coast Guard District New Orleans, Louisiana
CAPT Cecil Berry	Commanding Officer, USCG AR&SC Elizabeth City, North Carolina
CDR G. E. Gaul	Executive Officer, USCG AR&SC Elizabeth City, North Carolina
Mr. Ray Winberg	Industrial Manager, USCG Base Sault Ste. Marie, Michigan
Mr. Peter Belitsos	District Industrial Manager, First Coast Guard District, Boston Massachusetts
CAPT J. H. Wubbold	Commanding Officer, USCG Base Sault Ste. Marie, Michigan
Mr. Lin Budreau	District Industrial Manager, Seventh Coast Guard District, Miami, Florida
CDR M. D. Helton	Comptroller, USCG AR&SC Elizabeth City, North Carolina
Mr. John Denscomb	Planner - Repair Division AR&SC
LCDR D. A. Wilson	Industrial Manager, USCG Support Center, Portsmouth, Virginia
CAPT E. J. Ard	Commanding Officer, USCG Support Center, Portsmouth, Virginia
Mr. Carl Kraft	Industrial Accountant, USCG Support Center, Portsmouth, Virginia
CDR A. J. Taylor	Chief, Civil Engineering Branch, Fifth Coast Guard District, Portsmouth, Virginia
LCDR R. E. Fritz	Facilities Engineering Officer, USCG Aviation Training Center, Mobile, Alabama

UNITED STATES COAST GUARD
AIRCRAFT REPAIR AND SUPPLY CENTER
ELIZABETH CITY, NORTH CAROLINA

SUMMARY ANALYSIS OF COSTS
1 OCTOBER 1977 THRU 30 SEPTEMBER 1978

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UNITED STATES COAST GUARD
AIRCRAFT REPAIR AND SUPPLY CENTER

SUMMARY ANALYSIS OF COSTS - 1 OCTOBER 1977 THRU 30 SEPTEMBER 1978
FUNCTIONAL COSTS BY COST CENTER

COST CENTERS	BUDGETED	COSTS INCURRED	VARIANCE	STAFF COST REDISTRIBUTED	DIVISION COSTS - TOTAL	APPLIED TO WORK ORDERS	DIVISION COSTS - NET
MANAGEMENT AND SERVICES							
General Management	$ 429,768	$ 422,020	$ (7,748)	$ (422,020)	$ -0-	$ -0-	$ -0-
Management Info Serv Division	519,228	544,167	24,939	(544,167)	-0-	-0-	-0-
Aviation Supply Division (Less Field Supply)	368,556	375,271	6,715	(375,271)	-0-	-0-	-0-
Total Management and Services	$ 1,317,552	$ 1,341,458	$ 23,906	$ (1,341,458)	$ -0-	$ -0-	$ -0-
MISSION AND INDUSTRIAL							
Aviation Repair Division	$13,965,410	$13,895,392	$ (70,018)	$ 1,157,426	$ 15,052,818	$ (14,712,209)	$ 340,609
Field Supply	2,646,504	4,489,862	1,843,358*	787,201	5,227,063	-0-	5,277,063
Aviation Engineering Division	1,341,977	1,354,895	12,918	134,231	1,489,126	-0-	1,489,126
Aviation Training Division	958,416	1,178,318	219,902	362,241	1,540,559	-0-	1,540,559
Total Mission and Industrial	$18,912,307	$20,918,467	$ 2,006,160	$ 2,441,099	$ 23,359,566	$ (14,712,209)	$ 8,647,357
COSTS UNRELATED TO MISSION							
Transient Aircraft Maintenance		$ 21,395		$ -0-	$ 21,395	$ -0-	$ 21,395
Summer Aides		33,554		-0-	33,554	-0-	33,554
AOSS Support		(1,147)		-0-	(1,147)	-0-	(1,147)
Military Pay Clearing Account		58,804		-0-	58,804	-0-	58,804
ARSC Equipment		240,565		-0-	240,565	-0-	240,565
Accessorial Charges		840		-0-	840	-0-	840
TOTAL COSTS		$22,613,936		$ 1,099,641	$ 23,713,577	$ (14,712,209)	$ 9,001,368
Unbudgeted Variations							
*265 Overhaul Cost/Credit		$ 1,455,696					
Aviation Repair Division Indicators							
Labor Utilization Ratio	58.2%	58.1%	(0.1%)				
Overhead Rate	140.4%	145.7%	5.3%				

UNITED STATES COAST GUARD
AIRCRAFT REPAIR AND SUPPLY CENTER

STAFF COST SUMMARY - 1 OCTOBER 1977 THRU 30 SEPTEMBER 1978

	MONTHLY			CUMULATIVE		
	Actual	Budget	Variance	Actual	Budget	Variance
General Administration						
Military	$ 22,409	$ 18,631	$ 3,778	$ 258,177	$ 223,572	$ 34,605
Civilian	12,199	12,958	(759)	147,239	155,496	(8,257)
Staff	512	4,225	(3,713)	16,604	50,700	(34,096)
Aviation Supply Division						
Military	9,910	9,300	610	116,230	111,600	4,630
Civilian	23,077	21,051	2,026	256,719	252,612	4,107
Staff	563	362	201	2,322	4,344	(2,022)
MISD						
Military	1,739	4,534	(2,795)	44,904	54,408	(9,504)
Civilian	33,463	35,610	(2,147)	449,726	427,320	22,406
Staff	3,623	3,125	(498)	49,537	37,500	12,037
Personnel Costs	*102,797*	*102,084*	*713*	1,272,995	1,225,008	47,987
Staff Costs	4,698	7,712	(3,014)	68,463	92,544	(24,081)
TOTAL COSTS	$ 112,193	$ 109,796	$ 2,397	$ 1,341,458	$ 1,317,552	$ 23,906
Staff Costs						
Awards	$ 35	$ 375	$ (340)	$ 4,985	$ 4,500	$ 485
Supplies and Materials	3,009	3,737	(728)	25,302	44,844	(19,542)
Union Negotiations	13	100	(87)	611	1,200	(589)
Machine Rentals and Maintenance	929	3,125	(2,196)	25,426	37,500	(12,074)
Travel	712	375	337	12,139	4,500	7,639
TOTALS	$ 4,698	$ 7,712	$ (3,014)	$ 68,463	$ 92,544	$ (24,081)

UNITED STATES COAST GUARD
AIRCRAFT REPAIR AND SUPPLY CENTER

AVIATION REPAIR DIVISION COST SUMMARY - 1 OCTOBER 1977 THRU 30 SEPTEMBER 1978

	CURRENT MONTH			CUMULATIVE		
DIRECT COSTS	Actual	Budget	Variance	Actual	Budget	Variance
Direct Labor	$ 242,543	$ 250,145	$ (7,602)	$ 2,939,004	$ 3,001,740	$ (62,736)
Material	733,287			7,629,634		
Fuel	1,333			29,765		
TOTAL DIRECT COSTS	$ 977,163	$ 250,145	$ (7,602)	$10,598,403	$ 3,001,740	$ (62,736)
INDIRECT COSTS						
Personnel Costs	$ 173,328	$ 179,725	$ (6,397)	$ 2,119,232	$ 2,156,700	$ (37,468)
Test-Training Flying	1,919	1,792	127	15,627	21,504	(5,877)
Supplies and Materials	9,522	13,333	(3,811)	151,236	159,996	(8,760)
Maintenance Assigned Aircraft	1,358	6,208	(4,850)	52,364	74,496	(22,132)
Shop Maintenance Materials	13,298	14,292	(994)	168,266	171,504	(3,238)
Base and Structure Maintenance	51,735	45,625	6,110	617,693	547,500	70,193
Redistributed Staff Costs	88,078	90,185	(2,107)	1,157,426	1,082,220	75,206
TOTAL OVERHEAD COSTS	$ 339,238	$ 351,160	$ (11,922)	$ 4,281,844	$ 4,213,920	$ 67,924
Total Industrial Costs	$ 1,316,401			$14,880,247		
Total Cost Applied to Work Orders	(1,315,758)			(14,712,209)		
(Over) or Under Absorbed Overhead Variance	643			168,038		
Overhead Rate	139.8%	140.4%	(0.6%)	145.7%	140.4%	5.3%
Overhead Rate Applied	140.0%	140.0%		140.0%	140.0%	
Non-Industrial Costs						
Equipment and Plant Improvement	13,335			172,571		
TOTAL DIVISION COST	1,329,736			15,052,818		
Net Division Cost	13,978			340,609		
Labor Utilization Ratio	58.3%	58.2%	0.1%	58.1%	58.2%	(0.1%)

UNITED STATES COAST GUARD
AIRCRAFT REPAIR AND SUPPLY CENTER

AVIATION REPAIR DIVISION - ANALYSIS OF WORK ORDER COSTS
1 OCTOBER 1977 THRU 30 SEPTEMBER 1978

A. Type of Work	CURRENT MONTH Aircraft Maintenance		Avionics		Totals		CUMULATIVE Totals	
Overhaul and Repair of Aircraft	$ 796,531	70.4%	$ 94,020	51.2%	$ 890,551	67.7%	$ 9,446,224	64.2%
Repair of 26S Material - 41FS	329,259	29.1%	23,790	12.9%	353,049	26.8%	4,219,369	28.7%
Repair of 26S Material - 42FS	1,005	0.1%	57,295	31.1%	58,300	4.4%	562,019	3.8%
Continuous Work Orders	(1,095)		2,156	1.2%	1,061	0.1%	276,330	1.9%
Specific and Miscellaneous Projects	6,110	0.5%	6,688	3.6%	12,798	1.0%	208,269	1.4%
Total Charges to Work Orders	$ 1,131,810		$ 183,949		$ 1,315,759		$14,712,211	

		RETURNS		COST	COST PER DOLLAR RETURNED FY 78	FY 77
Ove haul of 26S Material (Cumulative)						
Commercial		$ 9,100,241	Actual	$ 3,662,173	40.2%	32.7%
			Standard	(2,281,348)	30.0%	20.0%
				$ 1,380,825		
Aviation Repair Division	15,253,087		Actual	$ 4,219,369	27.6%	25.6%
Engine Repair	3,603,416	18,856,503	Standard	(3,704,178)	30.0%	20.0%
				$ 515,191		
Overhaul of 42FS Material (Commercial)		674,083	Actual	$ 77,640	11.5%	20.3%
			Standard	(167,036)	30.0%	20.0%
				$ (89,396)		
Overhaul of SH 42FS 26S Material (Shop 233) (Includes $157,790 of NTNO Returns)		5,769,864	Actual	$ 562,019	9.7%	10.4%
			Standard	(1,381,736)	30.0%	20.0%
				$ (819,717)		
Overhaul of Aircraft Engines		7,977,730	Actual	$ 2,566,074	22.1%	21.8%
			Standard	(2,895,862)	30.0%	20.0%
				$ (329,788)		
OGA Overhaul		6,627,980	Actual	$ 2,162,898	32.6%	30.5%
			Standard	(1,364,317)	30.0%	20.0%
				$ 798,581		
Totals		$ 49,006,401	Actual	$ 13,250,173	27.0%	24.4%
			Standard	(11,794,477)	30.0%	20.0%
				$ 1,455,696		

UNITED STATES COAST GUARD
AIRCRAFT REPAIR AND SUPPLY CENTER

COST ANALYSIS OF REPAIR OF 265 MATERIAL
1 OCTOBER 1977 THRU 30 SEPTEMBER 1978

	HOURS	COST	MATERIALS CHARGES	MATERIALS CREDITS	NET MATERIAL COST	OVERHEAD	TOTAL COST	RFI RETURNS	COST PERCENTAGE MONTHLY	COST PERCENTAGE TO DATE
Electronic Overhaul	1,982	13,772	27,809	2,562	25,247	19,281	58,300	477,434		
Electronic Overhaul of NTNO		(Hours and Cost included in above)						5,579		
Monthly Subtotals	1,982	13,772	27,809	2,562	25,247	19,281	58,300	483,013	12.1	
Cumulative Subtotals	24,388	165,301	271,128	105,825	165,303	231,415	562,019	5,650,765		9.9
Customer Serv - NAS NORVA	0	0	6,367	0	6,367	0	6,367	0	0	0
Metal	51	321	67	2,715	(2,648)	449	(1,878)	11,722	0	22.5
*Major Components	2,885	18,730	119,725	13,562	106,163	26,222	151,115	985,038	15.3	24.0
**Engine Build-up	678	4,390	108,636	17,573	91,063	6,146	101,599	59,460	0	14.8
Accessories	2,401	15,716	21,761	9,832	11,929	22,004	49,649	470,838	10.5	25.9
Electrical Overhaul	620	4,456	19,349	0	19,349	6,239	30,044	51,959	57.8	19.6
Instrument	717	5,445	3,085	0	3,085	7,623	16,153	83,655	19.3	14.0
Monthly Subtotals	7,352	49,058	278,990	43,682	235,308	68,683	353,049	1,662,672	21.2	0
Cumulative Subtotals	92,617	612,783	3,518,646	769,741	2,748,905	857,681	4,219,369	18,975,602	0	22.2
Monthly Totals	9,334	62,830	306,799	46,244	260,555	87,964	411,349	2,145,685	19.2	0
Cumulative Totals	117,005	778,084	3,789,774	875,566	2,914,208	1,089,096	4,781,388	24,626,367	0	19.4

*Reduction Gear Boxes Returned:	6 ea		194,406
**Engines returned	1 ea	2810	55,000
			249,406

UNITED STATES COAST GUARD
AIRCRAFT REPAIR AND SUPPLY CENTER

FIELD SUPPLY COST SUMMARY - 1 OCTOBER 1977 THRU 30 SEPTEMBER 1978

Item	MONTHLY Actual	MONTHLY Budget	MONTHLY Variance	CUMULATIVE Actual	CUMULATIVE Budget	CUMULATIVE Variance
Personnel Services						
Military	$ 31,489	$ 24,064	$ 7,425	$ 329,260	$ 288,768	$ 40,492
Civilian	92,803	91,973	830	1,133,568	1,103,676	29,892
Total Personnel Services	$ 124,292	$ 116,037	$ 8,255	$ 1,462,828	$ 1,392,444	$ 70,384
Transportation	26,144	40,458	(14,314)	568,430	485,496	82,934
Other Services	21,046	15,625	5,421	236,112	187,500	48,612
Accessorial Costs	27,052	28,750	(1,698)	467,667	345,000	122,667
Supplies	10,619	5,542	5,077	87,301	66,504	20,797
Base and Structure Maintenance	14,511	14,130	381	211,828	169,560	42,268
Redistributed from Staff	63,602	59,694	3,908	787,201	716,328	70,873
265 Overhaul Cost	67,885	-0-	67,885	1,455,696	-0-	1,455,696
TOTAL COST	$ 355,151	$ 280,236	$ 74,915	$ 5,277,063	$ 3,362,832	$ 1,914,231

AIRCRAFT REPAIR AND SUPPLY CENTER - AVIATION TRAINING DIVISION COST SUMMARY
1 OCTOBER 1977 THRU 30 SEPTEMBER 1978

Personnel Services						
Civilian	$ 4,137	$ -0-	$ 4,137	$ 6,444	$ -0-	$ 6,444
Military	96,623	68,506	28,117	1,003,981	822,072	181,909
Aircraft Maintenance	276	125	151	13,581	1,500	12,081
Base and Structure Maintenance	9,811	6,612	3,199	100,389	79,344	21,045
Supplies and Materials	3,083	4,625	(1,542)	53,923	55,500	(1,577)
Redistributed from Staff	36,688	24,085	12,603	362,241	289,020	73,221
TOTALS	$ 150,618	$ 103,953	$ 46,665	$ 1,540,559	$ 1,247,436	$ 293,123
Average Number of Students (AD)	66			65		
Cost of Students Per Month	$ 1,163			$ 1,004		
Average Number of Students (AT)	73			63		
Cost of Students Per Month	$ 1,011			$ 988		

UNITED STATES COAST GUARD
AIRCRAFT REPAIR AND SUPPLY CENTER

AVIATION ENGINEERING DIVISION COST SUMMARY
1 OCTOBER 1977 THRU 30 SEPTEMBER 1978

Item	MONTHLY Actual	MONTHLY Budget	MONTHLY Variance	CUMULATIVE Actual	CUMULATIVE Budget	CUMULATIVE Variance
Personnel Services						
Military	$ 21,186	$ 31,754	$ (10,568)	$ 421,058	$ 381,048	$ 40,010
Civilian	3,801	7,789	(3,988)	48,881	93,468	(44,587)
Total Personnel Services	$ 24,987	$ 39,543	$ (14,556)	$ 469,939	$ 474,516	$ (4,577)
Prototype Work Orders	81,686	-0-	81,686	719,622	-0-	719,622
Support Work Orders	16,393	-0-	16,393	87,287	-0-	87,287
Supplies and Materials	889	287	602	5,433	3,444	1,989
Base and Structure Maintenance	5,224	4,759	465	72,614	57,108	15,506
Redistributed from Staff	8,168	11,996	(3,828)	134,231	143,952	(9,721)
TOTAL COST	$ 137,347	$ 56,585	$ 80,762	$ 1,489,126	$ 679,020	$ 810,106

Department of Transportation
U.S. Coast Guard
CG ARSC 5000-2A/3-70

Production
Work Progress Report #1 - 1
Month Ending 31 July, 1978

Work Order No.	******Aircraft Rework****	A/C No.	Estab-lished Date	Est Comp Date	% Comp	Comple-tion Date	Man-Hours Expenced this Month Aircraft Maint.	Avionics	Cumul-ative	Estim-ated	$Labor $Ovhead $Material
C 1043	Support C131 Mod	5800	22Nov77	27Feb78	100	18Mar78			1,473	800	$29,566
	Total Man-Hours this Month				*		256	8	120,267		$3,312,073
	Monthly Manhour Total				**	265					
	Fiscal Cumulative Manhour Total				***	223,793					

****

Department of Transportation
U.S Coast Guard
CG ARSC 5000-28/3-70

Production
Work Progress Report #2 - 1
Month Ending 31 July 1978

Work Order No.	*** Indirect ***	Man-Hours this Month Aircraft Maint.	Avionics	Cumulative	Cumulative Cost
0001	Annual Leave	6,134	637	6,772	$45,727
	Total Man-Hours this Month	17,950	1,998	19,957	$141,021
	Monthly Manhour Total 20,237				
	Fiscal Cumulative Manhour Total 178,830				

Department of Transportation
U.S Coast Guard
CG ARSC 5000-28/3-70

Production
Work Progress Report #3 - 1
Month Ending 31 July, 1978

Work Order No.	*** Direct Continuous ***	Man-Hours this Month: Aircraft Maint.	Avionics	Cumulative	Cumulative Cost
0403	Support C0131 Aircraft under Mod	16		16	$101
	Total Man-Hours this Month *	1,542	92	1,639	$11,165
	Monthly Manhour Total ** 1,639				
	Fiscal Cumulative Manhour Total *** 16,241				

****

Department of Transportation
U.S. Coast Guard
CG ARSC 5000-2A/3-70

Engineering
Work Progress Report #4A - 1
Month Ending 31 July, 1978

Work Order No.	***Projects Direct***	A/C No.	Estab-Lished Date	Est. Comp Date	% Comp	Comple-Tion Date	Man-Hours Expended this Month: Aircraft Maint.	Avionics	Cumul-ative	Estim-ated	$Labor $Ovhead $Material
0 1401	Trnspt H52 1382 Kodiak		21Jun78	14Jul78	100	18Jul78	35		708	160	$11,510

Department of Transportation
U.S Coast Guard
CG ARSC 5000-20/12-72

Production
Work Progress Report #5 - 1
Month Ending 31 July, 1978

Work Order No.	**Completed*** Work Orders	A/C No.	Compl Work Date	Days In Proc	Direct Labor Man-Hours: Maint. Hours/ Cost	Avionics Hours/ Cost	Overhaul Hours Ovhd Cost	*** / Cost	Net Material Charges	Modification Hours Cost	Total Hours/ Cost
1012	Overhaul H52	1416	060178	102	4,976	738	5,712	189,658	$56,788		5,712

APPENDIX E

The information required and a suggested report format is shown below.

FACILITIES ENGINEERING MANAGEMENT REPORT

(RCS-G-ECV-3092)

Unit Facilities and Demographic Information

A. Authorized complement of unit and tenant commands

	Officer	Enlisted	Civilian	Total
1. Unit	_____	_____	_____	_____
2. Tenants Ashore	_____	_____	_____	_____
3. Tenants Afloat	_____	_____	_____	_____

B. Average transient/student population (if significant) _____

C. Square Footage of Building by real property category:

1. Office (10) _____ KSF
2. Institutional (21, 22, 23, 29) _____
3. Housing (30) _____
4. Storage (40) _____
5. Industrial (50) _____
6. Service (60) _____
7. All other _____
8. Total _____
9. Maintained by others (tenant, ind., etc.) _____
10. $C_8 - C_9$ _____

D. Annual energy consumption

1. Electricity _____ KWH
2. Water _____ MG
3. Sewage _____ MG

4. Oil _____ GAL

5. Natural Gas _____ MCUFT

Organization and Staffing of Facilities Engineering Division

E. Attach following for Facilities Engineering Division

1. Division organization chart

2. Authorized personnel (billet/position) roster annotated with salaries (base pay + BAQ + BAS for military)

F. Total authorized complement of Facilities Engineering Division

Officer	Warrant	Enlisted	Civilian Gen. Sch.	Civilian Wage Grade	Total
_____	_____	_____	_____	_____	_____

G. Functional assignment of Facilities Engineering Division complement. (Use decimals in instances where individual assignments encompass more than one function.)

Function	Number of Persons	Salaries (01, 08, 30) + BAQ + BAS for military
1. Performing services (refuse removal, pest control, vehicle dispatch, etc.)	_____	_____
2. Assigned to prime production and plant maintenance of utilities (electric, central heating, water/sewage treatment)	_____	_____
3. Assigned to functions not integral to facilities engineering operations (mess cooks, duty driving, barracks housekeeping, housing administration, fire protection, etc. see Section D.E.	_____	_____
4. Performing vehicle maintenance.	_____	_____
5. Performing major, minor, service and standing maintenance work (Include janitorial, groundskeeping and service teams. Exclude supervision and overhead).	_____	_____

Function	Number of Persons	Salaries (01, 08, 30) + BAQ + BAS for military
6. Supervising major, minor, service and standing maintenance work (first and second level).	_____	_____
7. Performing in overhead capacity for major, minor, service, and standing maintenance work (maintenance control, procurement, inventory control, engineering/technical assistance, clerical in support of direct maintenance).	_____	_____
8. Division management and administration (PWO, APWO, Division clerical and timekeeping, OG-43/AC&I design and administration).	_____	_____

NOTE: (1) $\sum_{8}^{1} G$ should = F_{Total}

(2) For items G1, 2, 3, 4, 7, 8 include supervisory positions.

H. Distribution of effort:

1. Services $\frac{G_1}{F_{Total}} \times 100 = $ _____ %

2. Maintenance Work $\frac{G_5}{F_{Total}} \times 100 = $ _____ %

3. Worker/Supervisor Ratio for Maintenance Work $\frac{G_5}{G_6} = $ _____ Workers/ Super.

4. Worker/Supervision and Overhead for Maintenance Work $\frac{G_5}{G_6 + G_7} = $ _____ Workers/ Super. + OHD

Financial Information Related to Facilities Engineering

I. Total facilities engineering division salaries (OG 01, 08, 30 include BAQ + BAS for military) _____

J. Expenditures for unit for last fiscal year

	OG	Object Code	Subj	
1.	43	All	Total	_____
2.	30	All	Total	_____
3.	30	2303	Utilities	_____
4.	30	3144	EQ Replacement	_____
5.	30	2668	Fuel	_____
6.	30	2634	Housekeeping	_____
7.	30	2544	Services Maint.	_____
8.	30	2644	Supplies & Mat. Maint.	_____

K. OG 43 Backlog (Dollars) _____

Workload, Performance and Productivity Data

The information to be provided in this section should be limited to the maintenance/services component of the facilities engineering organization (see Section D.3).

L. Manhours Assigned

1. Regular workforce _____

2. Augmented (Reserves, temporaries, transients, overtime, etc.) Include military watchstanding manhours devoted to actual routine/preventive checks and inspections and corrective maintenance work. Do not include manhours devoted to stand-by or "security" type services. Any compensatory time granted is to be deducted. _____

3. Total _____

M. Manhours Available (manhours assigned - L_3 minus authorized non-productive manhours - i.e. leave, illness, training, administrative affairs, inspections, special liberty, compensatory time, etc.) _____

N. Work Performed In-House (see definitions Section V)

	Manhours	Cost of Materials
1. Major	_____	_____
2. Minor	_____	_____
3. Service	_____	_____
4. Standing	_____	_____
5. Total Work	_____	_____
6. Emergency	_____	_____
7. Non-emergency	_____	_____
8. Unscheduled	_____	_____
9. Scheduled	_____	_____
10. Planned & Estimated	_____	_____

NOTE: The following relationship should be true:

$$(N_1 + N_2 + N_3 + N_4) = (N_5) = (N_6 + N_7) = (N_8 + N_9)$$

O. Average Continuous Backlog

(Average volume of work awaiting available manhours for execution expressed in crew-weeks. The amount of time required for the maintenance work force to execute known work items assuming no new input.) _____

P. Management Indices

1. $\dfrac{\text{Emergency Manhours Worked}}{\text{Total Manhours Worked}} = \dfrac{N_6}{N_5} = $ _____

2. Scheduled Manhours Worked / Total Manhours Worked = $\frac{N_9}{N_5}$ = _____

3. Planned & Estimated Manhours Worked / Total Manhours Worked = $\frac{N_{10}}{N_5}$ = _____

4. Utilization = $\frac{\text{Manhours Available}}{\text{Manhours Assigned}} = \frac{M}{L}$ = _____

5. Performance = $\frac{\text{Estimated Manhours Allowed}}{\text{Actual Manhours Required}}$ = _____

6. Productivity = Utilization x Performance = _____

7. Salary Rate = $\frac{G_5 \text{ (Salary)}}{L_1 \text{ (Manhours assigned)}}$ = _____ $/MNHR

8. Labor Intensity = $\frac{\text{Cost of Labor}}{\text{Cost of Materials}} = \frac{P_7 \times N_5 \text{ manhours}}{N_5 \text{ materials}}$ = _____

9. Gross Maintenance Rate = $\frac{(N_{5\ MNHRS} \times P_7) + N_{5\ MAT}}{C_{10}}$ = _____ $/SQFT

Q. Remarks or comments on any of the previous data (optional/situational).

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